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Ship Building on the Lakes

THE ship yards of the great lakes have forty-six vessels under construction for 1910 delivery, including 22 bulk freighters, 5 package freighters, 5 passenger boats, 1 ferry steamer, 6 tugs, 2 hopper barges, 1 fire boat, 1 lighter, 1 light vessel, 1 light-house tender and 1 scow. Of this program the American Ship Building Co. is building 20, the Great Lakes Engineering Works 9, the Toledo Ship Building Co. 3, the Manitowoc Dry Dock Co. 2, the Racine Boat Manufacturing Co. 2, Johnston Bros. 5, the Collingwood Ship Building Co. 3 and the Toronto Shipyards 2.

Again subdividing the program, the American Ship Building Co.'s new construction consists of 12 bulk freighters, 4 package freighters, 2 passenger boats, 1 fire boat and 1 ferry steamer. Of this program the passenger boat Rochester, the package freighter Octorara, the bulk freighters W. B. Schiller, John P. Morgan Jr., and A. A. Augustus have already been launched. The Great Lakes Engineering Works have under construction 8 bulk freighters and 1 package freighter. Of this program the package freighter North Star has been launched. The Toledo Ship Building Co. is building a bulk freighter, a lumber steamer and an excursion steamer; the Manitowoc Dry Dock Co. a passenger steamer and a lighter of which the passenger steamer, the Alabama, has been launched; the Racine Boat Manufacturing Co., a light vessel and a light-house tender; Johnston Bros. 5 tugs; the Collingwood Ship Building Co. 1 tug and 2 hopper barges; and the Toronto Shipyards 1 passenger steamer and 1 scow.

It should be mentioned that the Collingwood Ship Building Co. is lengthening the steamer Athabasca belonging to the Canadian Pacific Railway Co. 36 ft., which will make her 306 ft. over all, at a cost of about $50,000. Contract has also been secured by the company to lengthen the steamer G. R. Crowe of the St. Lawrence & Chicago Steam Navigation Co.'s fleet 72 ft., giving her a new length of 324 ft. and gross tonnage estimated at 2,760, at an approximate cost of $60,000.

The 22 bulk freighters included in this program have a carrying capacity of 203,740 gross tons of ore in a single trip or 4,074,800 tons in an average season of twenty trips.

It will be observed in the launching table published elsewhere that 17 bulk freighters were put overboard in 1909 having a capacity of 157,300 tons on a single trip or 3,146,000 tons in an average season of 20 trips. In the past eight years vessels having a gross carrying capacity of 37,013,200 gross tons in full season have been added to the available ore carrying fleet. The 1910 program will increase this to 41,088,000 gross tons. This is more than has ever been carried down the lakes in any one year with the exception of the years 1907 and 1909 when 41,288,755 tons and 41,683,873 tons were moved respectively.

With the exception of the Pittsburg Steamship Co., which is the lake end of the United States Steel Corporation, none of the steel-making companies appear to figure in the 1910 ship building program, though it will be observed that in some instances the names of the owners have been withheld by the ship builders.

Altogether 39 vessels were launched during 1909, of which 17 were bulk freighters, 5 package freighters, 5 passenger steamers, 6 tugs, 5 lighters and 1 survey steamer. The number of accidents during the year were many, some of them severe, and repair work during the winter months will be very heavy. The lake shipyards may therefore be said to be enjoying unusual prosperity, as repair work is admittedly more profitable than new construction.

Vessels Under Construction in Great Lakes Ship Yards for 1910 Delivery

AMERICAN SHIP BUILDING CO.'S YARDS

To be built at	Type or Name	Dimensions in ft. Over all	Keel	Beam	Depth	Dimensions of Engines	Boilers, dimensions in feet and inches	Draft	Steam Pressure, Pounds	Capacity, Gross Tons	For whom building
Wyandotte...	Pass. Str Rochester	256	246	42	14.9	16, 25, 31, 31 x 22	4 Scotch 11-6 x 11	Howden	165	.....	Richelieu & Ontario Navigation Co., Montreal, Can.
Wyandotte...	Pkg. Ftr. Octorara	361	340	45	28	22, 31½, 45, 65 x 42	4 Scotch 12-6 x 11-6	Howden	210	4,800	Anchor Line, Buffalo, N. Y.
Cleveland	Ftr.	524	504	54	30	23¼, 38, 63 x 42	2 Scotch 14-6 x 11-6	Ellis & Eaves	180	9,000	W. C. Richardson, Cleveland, O.
Lorain	Ftr., W.B. Schiller	600	580	58	32	24, 39, 65 x 42	2 Scotch 16 x 11-6	Ellis & Eaves	170	12,000	Pittsburg S. S. Co., Cleveland, O.
Lorain	Ftr., J. P. Morgan Jr	600	580	58	32	24, 39, 65 x 42	2 Scotch 16 x 11-6	Ellis & Eaves	170	12,000	Pittsburg S. S. Co., Cleveland, O.
Lorain	Ftr., A. A. Augustus	524	504	54	30	23¼, 38, 63 x 42	2 Scotch 14-6 x 11-6	Ellis & Eaves	180	9,000	C. L. Hutchinson, Cleveland, O.
Lorain	Ftr.	524	504	54	30	23¼, 38, 63 x 42	2 Scotch 14-6 x 11 6	Ellis & Eaves	180	9,000	J. J. Barlum, Detroit, Mich.
Lorain	Ftr.	524	504	54	30	23¼, 38, 63 x 42	2 Scotch 14-6 x 11-6	Ellis & Eaves	180	9,000	....
Lorain	Ftr.	545	525	58	31	23¼, 38, 63 x 42	2 Scotch 15-6 x 11-6	Ellis & Eaves	180	10,000	U. S. Transportation Co., Cleveland, O.
Buffalo.....	Pass. Str.	215	200	45	16	20, 32, 50 x 36	2 Scotch 13-2 x 11-6	Ellis & Eaves	180	.....	Lake Erie Excursion Co., Buffalo, N. Y.
Detroit.	Pkg. Ftr.	257	244	43	26.6	17½, 25¼, 37, 54 x 36	2 Scotch 12-6 x 11-6	Howden	210	3,000	Rutland Transit Co., Ogdensburg, N. Y.
Detroit.....	Pkg. Ftr.	257	244	43	26.6	17½, 25½, 37, 54 x 36	2 Scotch 12-6 x 11-6	Howden	210	3,000	Rutland Transit Co., Ogdensburg, N. Y.
Detroit	Ftr.	524	504	54	30	23¼, 38, 63 x 42	2 Scotch 14-6 x 11-6	Ellis & Eaves	180	9,000	H. K Oakes, Detroit, Mich.
Lorain.....	Ftr.	524	504	54	30	23½, 38, 63 x 42	2 Scotch 14-6 x 11-6	Ellis & Eaves	180	9,000	....
Lorain.....	Ftr.	524	504	54	30	23½, 38, 63 x 42	2 Scotch 14-6 x 11-6	Ellis & Eaves	180	9,000	.....
Cleveland....	Ftr.	524	504	54	30	23½, 38, 63 x 42	2 Scotch 14-6 x 11-6	Ellis & Eaves	180	9 000	.....
West Superior	Ftr.	524	504	54	30	23½, 38, 63 x 42	2 Scotch 14-6 x 11-6	Ellis & Eaves	150	9,000	.....
Buffalo.....	Ferry Str.	131	121	38	14	20, 20 x 22	1 Firebox 9-6 x 15	.....	150	.....	International Ferry Co., Buffalo, N. Y.
Detroit.....	Pkg. Ftr.	372	350	46	30	19, 27½, 40, 58 x 42	3 Scotch 11-6 x 11-6	Howden	210	5,000	Anchor Line, Buffalo, N. Y.
Lorain..	Fire Tug	120	110	28	15	20, 20 x 24	2 Scotch 13-9 x 11-6	Forced	180	...	Duluth & Iron Range Ry., Duluth, Minn.

GREAT LAKES ENGINEERING WORKS, DETROIT, MICH.

St. Clair	Pkg. Ftr. North Star	370	350	46	30	19, 27½, 40, 58 x 42	3 Scotch 11-6 x 11	Great Lakes Htd.	210	5,000	Mutual Transit Co., Buffalo, N. Y.
Ecorse	Ftr. St. Clair	465	444	56	30	22½, 36, 60 x 42	2 Scotch 13-9 x 11-6	Great Lakes Htd.	180	7,500	Northern Lakes S. S. Co., Cleveland, O.
Ecorse.....	Ftr. Champlain	465	444	56	30	22½, 36, 60 x 42	2 Scotch 13-9 x 11-6	Great Lakes Htd.	180	7,500	Northern Lakes S. S. Co., Cleveland, O.
Ecorse.....	Ftr Ontario	465	444	56	30	22½, 36, 60 x 42	2 Scotch 13-9 x 11-6	Great Lakes Htd.	180	7,500	Northern Lakes S. S. Co., Cleveland, O.
Ecorse	Ftr., Wm J. Olcott	605	580	58	32	24, 38, 65 x 42	2 Scotch 16 x 11-8	Induced	170	12,000	Pittsburg S. S. Co., Cleveland, O.
Ecorse	Ftr., Wm. B. Dickson	605	580	58	32	24, 38, 65 x 42	2 Scotch 16 x 11-8	Induced	170	12,000	Pittsburg S. S. Co , Cleveland, O.
Ecorse .....[illegible]	Ftr., Wm. P. Palmer	605	580	58	32	24, 38, 65 x 42	2 Scotch 16 x 11-8	Induced	170	12,000	Pittsburg S. S. Co., Cleveland, O.
St. Clair	Ftr., Harry Yates	550	530	56	31	23, 37, 63 x 42	2 Scotch 15 x 11-6	Great Lakes Htd.	180	10,000	Boland & Cornelius, Buffalo, N. Y.
St. Clair	Ftr.	550	530	56	31	23, 37, 63 x 42	2 Scotch 15 x 11-6	Great Lakes Htd.	180	10,000	.....

TOLEDO SHIP BUILDING CO., TOLEDO, O.

Toledo	Ftr.	525	504	58	30	20, 29, 42, 61 x 42	3 Scotch 12-6 x 11-10½	Heated Forced	210	9,000	U. S Transportation Co., Cleveland, O.
Toledo	Excursion Str.	196	181	50	17.6	20½, 32, 50 x 36	2 Scotch 13 2 x 12	Heated Forced	180	About 3,200 Pass.	Detroit, Belle Isle & Windsor Ferry Co., Detroit, Mich.
Toledo	Lumber Str.	236	220	40	17	17¼, 27½, 43 x 30	2 Scotch 11 x 11	Natural	170	2,240	Argo S. S. Co., Cleveland, O.

MANITOWOC DRY DOCK CO., MANITOWOC, WIS.

Manitowoc....	Pass. Str. Alabama	272	250	44	17	23, 38, 62 x 36	3 Scotch 12-6 x 11	.....	180	2,700	Goodrich Transit Co., Chicago, Ill.
Manitowoc....	Lighter Adele	140	...	40	9	No Power	.....	.....	....	450	Western Transit Co., Buffalo, N. Y.

RACINE BOAT MANUFACTURING CO., MUSKEGON, MICH.

Muskegon	Light Vessel No. 94	135	112	29	15.4	16, 31 x 24	2 Scotch 10-6 x 10	Natural	....	660	Light-House Department
Muskegon	Light-House Tender Camillia	116	106	24	10 2	8, 13, 20 x 16	2 Almy Water-tube	Natural	225	239	Light-House Department

JOHNSTON BROS., FERRYSBURG, MICH.

Ferrysburg ...	Flora M. Hill	140	128	25	10.6	16, 34 x 26	Scotch 11-6 x 12	Natural	150	525	Hill Steamboat Line, Kenosha, Wis.
Ferrysburg ...	No. 37	78	68	16	8.6	High pressure 18 x 20	Firebox 7 x 12	Natural	150	65	A. Fisher & Sons, Grand Haven, Mich.
Ferrysburg ...	No. 38	81.6	71	20	10	16, 32 x 24	Scotch 11 x 12	Natural	150	88	Builders' Account
Ferrysburg ...	No. 39	85	74	18	8.6	12, 24 x 16	Scotch 9 x 11	Natural	160	75	U. S. Bureau of Fisheries, Put-in-Bay, O.
Ferrysburg ...	No 40	90	78	21	12	16, 34 x 26	Scotch 11-6 x 12	Natural	150	112	Barnett & Record Co., Duluth, Minn.

COLLINGWOOD SHIP BUILDING CO., LTD., COLLINGWOOD, ONT.

Collingwood..	Tug	108	..	....	....	15, 30 x 24 Double engine	Firebox 8-6 x 13-6 Steam operating gear	.....	...	220	Upper Ottawa Improvement Co, Ltd. Ottawa, Canada
Collingwood..	Steel hopper barge	130	....	....	...	8-in. x 8-in.		.....		450	Owen Sound Ddg. & Const Co., Ltd.
Collingwood..	Steel hopper barge	130	....	....	....	Double engine 8-in x 8-in.	Steam operating gear	.....	..	cu. yds 450 cu. yds	Owen Sound, Ont. Canadian Dredging Co. Ltd. Midland, Ont

TORONTO SHIPYARDS, TORONTO, ONT.

Toronto	Scow No. 3	103	....	29	9	10	.....	.....	.....	..	300 yds Public Works Department, Canada
Toronto.....	Pass. Str.	204	196	6 43	6	10	4-cyl. comp. twin-screw	Scotch	.....	165	..... Richelieu & Ontario Navigation Co., Montreal, Que.

Merchant Work in Coast Yards

The William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.

Steel steamer Gen. George H. Weeks, for the Quartermaster's Department, U. S. army. 120 ft. long over all; 338.7 tons displacement; triple expansion, single screw engines of 550 H. P.; one Scotch boiler. Valued at $79,000.

Steel steamer Gen. S. B. Holabird, for the Quartermaster's Department, U. S. army. 120 ft. long over all; 338.7 tons displacement; triple expansion, single screw engines of 550 H. P.; one Scotch boiler. Valued at $79,000.

Steel steamer Gen. D. S. Stanley, for the Quartermaster's Department, U. S. army. 120 ft. long over all; 338.7 tons displacement; triple expansion, single screw engines of 550 H. P.; one Scotch boiler. Valued at $79,000.

One steel coal barge for the Panama Railroad Co. 85 ft. long over all; capacity, 250 tons. Valued at $10,000.

Fore River Ship Building Co., Quincy, Mass.

Steam yacht Aloha, for A. C. James. 201 ft. long over all; 35 ft. beam, 21 ft. 4 in. deep; engine of 400 I. H. P. with cylinders 12, 19 and 30 in. diameter by 24 in. stroke; Yarrow water tube boilers.

Sulphur steamer Herman Frasch, for the Union Sulphur Co. 361 ft. long over all; 48 ft. beam; 30 ft. deep; engine of 2,100 I. H. P. with cylinders 25, 41 and 68 in. diameter by 48 in. stroke; three Scotch boilers, 13 ft. 9 in. in diameter by 11 ft. 10 in. long.

Lighter Miguelito, for the Porto Rico Commercial Co. 130 ft. long over all; 29 ft. beam; 8 ft. deep; compound engines with cylinders 9 and 18 in. in diameter by 12 in. stroke; one Scotch boiler 10 ft. in diameter and 10 ft. long.

Molasses barge Fifi, for the Cuba Distilling Co. 150 ft. long over all; 32 ft. beam, 9 ft. deep; one Scotch boiler 12 ft. 2½ in. in diameter by 6 ft. 3 in. long.

Molasses barge Graziela, for the Cuba Distilling Co. 150 ft. long over all; 32 ft. beam; 9 ft. deep; one Scotch boiler 12 ft. 2½ in. in diameter by 6 ft. 3 in. long.

Molasses barge Santa Maria II, for the Columbus Distilling Co. 115 ft. long over all; 26 ft. beam; 11 ft. deep.

Maryland Steel Co., Sparrows Point, Md.

Steel passenger steamer Three Rivers, for bay service, for the Maryland, Delaware & Virginia Railway Co., Baltimore. 187 ft. 10 in. long over all; 900 gross tons; 1,000-H. P. beam sidewheel engines; two return tubular boilers.

Steel freight steamer Kentuckian, for the American-Hawaiian Steamship Co., New York City. 429 ft. 2 in. long over all; 6,100 gross tons; 3,000-H. P. quadruple expansion, single screw engines; three Scotch boilers and one donkey boiler.

Steel freight steamer Georgian, for the American-Hawaiian Steamship Co., New York City. 429 ft. 2 in. long over all; 6,100 gross tons; 3,000-H. P. quadruple expansion, single screw engines; three Scotch boilers and one donkey boiler.

Steel freight and passenger steamer Honolulan, for the American-Hawaiian Steamship Co., New York City. 429 ft. 2 in. long over all; 6,100 gross tons; 4,000-H. P. quadruple expansion, single screw engines; three Scotch boilers and one donkey boiler.

Steel freight steamer Ruth, for the A. H. Buel Steamship Co., New York City. 325 ft. 3 in. long over all; 2,800 gross tons; 1,800-H. P. triple expansion, single screw engines; two Scotch boilers and one donkey boiler.

C. V. Minot Jr., Phippsburg, Me.

Has frame in stock for a four-masted schooner of 210 ft. keel, 43 ft. beam and 24 ft. depth. Will either build or sell.

The Moran Co., Seattle, Wash.

Steel steam cargo vessel for the market. 252 ft. long over all; 1,838 gross tons; single screw, triple expansion engine of 850 H. P.; two Scotch boilers.

Newport News Ship Building & Dry Dock Co., Newport News, Va.

Steel freight and passenger steamer Wilhelmina, for the Matson Navigation Co., San Francisco, Cal. 435 ft. long over all; 6,800 gross tons; single screw, triple expansion engines of 6,000 H. P.; six Scotch boilers.

Steel freight and passenger steamer Bear, for the San Francisco & Portland Steamship Co., San Francisco, Cal. 364 ft. long over all; 4,100 gross tons; single screw, triple expansion engines of 4,000 H. P.; six Scotch boilers.

Steel freight and passenger steamer Beaver, for the San Francisco & Portland Steamship Co., San Francisco, Cal. 364 ft. long over all; 4,100 gross tons; single screw, triple expansion engines of 4,000 H. P.; six Scotch boilers.

Steel freight and passenger steamer City of Montgomery, for the Ocean Steamship Co. of Savannah, Savannah, Ga. 378 ft. long over all; 5,600 gross tons; single screw, triple expansion engines of 2,500 H. P.; four Scotch boilers.

Steel freight and passenger steamer City of St. Louis, for the Ocean Steamship Co. of Savannah, Savannah, Ga. 378 ft. long over all; 5,600 gross tons; single screw, triple expansion engines of 2,500 H. P.; four Scotch boilers.

Steel oil tank steamer J. A. Chanslor, for the Associated Oil Co., of San Francisco. 383 ft. long over all; 5,200 gross tons; single screw, triple expansion engines of 2,000 H. P.; four Scotch boilers.

Four steel freight steamships, El Sol, El Mundo, El Oriente, El Occidente, for the Southern Pacific Co.,

New York City. Dimensions as follows: 410 ft. long over all; 5,700 gross tons; single screw, triple expansion engines of 5,800 H. P.; three Scotch boilers.

Steel freight steamer for the A. H. Bull Steamship Co., New York City. 317 ft. long over all; 2,800 gross tons; single screw, triple expansion engines of 1,500 H. P.; two Scotch boilers.

Steel freight and passenger steamer for the Old Dominion Steamship Co., New York City. 358 ft. long over all; 3,700 gross tons; single screw, triple expansion engines of 3,500 H. P.; four Scotch boilers.

The New York Ship Building Co., Camden, N. J.

One coal barge, 217 ft. long, 1,050 gross tons, for the Delaware & Lackawanna Railroad Co. Valued at $40,000.

Two single screw steam colliers for the Coastwise Transportation Co., Boston, Mass. Length over all, 376 ft.; 5,200 gross tons each; triple expansion engines of 1,700 H. P.; steam to be supplied by two Scotch boilers. Valued at $350,000 each.

One coal barge for the New York Ship Building Co., 220 ft. long, 1,120 gross tons. Valued at $42,000.

Two car floats for the N. Y. C. & H. R. R. Co., New York. 257 ft. long; 1,113 gross tons each. Valued at $42,000 each.

One transfer barge for the New York, Philadelphia & Norfolk Railroad Co. 340 ft. long, 1,300 gross tons. Valued at $47,000.

The Pusey & Jones Co., Wilmington, Del.

One double-ended steel hull ferry steamer 114 ft. over all, for the Quartermaster's Department, U. S. army, for use at Governor's Island, New York City; engines are three-cylinder compound, 16, 24 and 24 in. cylinder diameters by 18-in. stroke; two Scotch boilers 9 ft. 6 in. diameter by 10 ft. 9 in. long, with a working pressure of 165 lb.

One ocean-going steel hull towing steamer 118 ft. 6 in. long, for the Isthmian Canal Commission, to be stationed at the Pacific coast port of Ancon; she is to have one triple expansion engine with cylinders 13, 21 and 32 in. diameter by 24-in. stroke; one Scotch boiler 14 in. in diameter and 12 ft. 6 in. long, with a working pressure of 150 lb.

Harlan & Hollingsworth Corporation, Wilmington, Del.

Steel passenger and freight river steamers City of Wilmington and City of Philadelphia, for the Wilmington Steamboat Co., Wilmington, Del. 200 ft. over all; 669 gross tons; valued at $110,000; triple expansion surface condensing engines of 1,400 H. P.; two straight through type boilers.

Steel passenger and freight steamer Northland, for coastwise service of the Maine Steamship Co., of New York. 328 ft. over all; 3,300 gross tons; valued at $400,000; triple expansion surface condensing engines of 4,000 H. P.; six cylindrical type boilers.

Boilers for vessels being constructed or repaired elsewhere, as follows:

For rebuilding steam tug Vesta, one Scotch type boiler, for Boston Towboat Co., Boston, Mass.

For new dredge, one Scotch type boiler, Atlantic Dredging Co., Philadelphia, Pa.

For rebuilding tug William A. Jamison, one Scotch type boiler, Arbuckle Bros., New York City.

For rebuilding steamer Correction, two Scotch type boilers, Department of Correction, New York City.

For rebuilding tug Kathryn, one leg type boiler, D. J. Junk, Philadelphia, Pa.

For rebuilding steamer Pegasus, two straight through type boilers, Iron Steamboat Co., New York City.

For rebuilding steamer Perseus, two straight through type boilers, Iron Steamboat Co., New York City.

For rebuilding United States Light Vessel No. 69, one Scotch type boiler, Department of Commerce and Labor, Washington, D. C.

One Scotch type boiler for the United Engineering Works, San Francisco, Cal.

Two Scotch type boilers for the Moore & Scott Iron Works, San Francisco, Cal.

Gas Engine & Power Co., & Charles L. Seabury & Co., Cons., Morris Heights, N. Y.

High speed steam yacht of wood construction. 140 ft. long, with triple expansion, twin screw engines and one Seabury water tube boiler.

One steel cruising motor yacht. 115 ft. long, with 200-H. P. twin screw gasoline engines.

Staten Island Shipbuilding Co., Port Richmond, S. I., N. Y.

Steel tug Fulton, 105 ft. long, 181 gross tons, for the Delaware, Lackawanna & Western Railroad Co., New York; compound engines with cylinders 18 and 38 in. in diameter by 28-in. stroke; developing 700 H. P.; one Scotch boiler 14 ft. 6 in. x 12 ft.

Steel tug No. 490, for stock; 105 ft. long, 181 gross tons; compound engines of 700 H. P., with cylinders 18 and 38 in. in diameter by 26-in. stroke; one Scotch boiler, 14 x 12 ft.

Steel barge Tulsa, 172 ft. long over all, 495 gross tons, for the Texas Co.

Steel barge Caddo, 147 ft. long over all, 490 gross tons, for the Texas Co.

Steel steam derrick lighter No. 502, 125 ft. long over all, 400 gross tons; 750 H. P. compound engines, 18 and 38 in. cylinder diameters by 26-in. stroke; two Scotch boilers 10 ft. 7 in. x 11 ft.; for M. P. Smith Sons Co.

Two steel tugs for the Pennsylvania Railroad Co., New York, each as follows: 105 ft. over all; 175 gross tons; 650 H. P. compound engines with cylinders 18 and 36 in. in diameter by 26-in. stroke; one Scotch boiler 14 ft. 5 in. x 12 ft. 8 in.

Triple-expansion engines of 890 H. P. for the steam yacht Vanadis, owned by C. K. G. Billings, of Chicago, Ill.; cylinders 18¾, 29 and 45 in. in diameter by 26-in. stroke.

Boiler for the steel tug Shawanese, owned by the Lehigh Valley Railroad Co.; 10 ft. 6 in. x 16 ft. 6 in.

One Scotch boiler 14 x 12 ft., for H. Duboise Sons Co., New York City.

One single screw compound engine with cylinder 22 in. in diameter, and 26-in. stroke, for H. Duboise Sons Co., New York City.

One Scotch boiler 10 x 12 ft., for the wooden tug Cresan Co., owned by the Crescent Sand & Gravel Co., New York City.

George Lawley & Son Corporation, South Boston, Mass.

Wooden launch Kalmia, for H. J. Parks, New York City. 83 ft. long; two 50-H. P. Standard motors.

Wooden launch Honey Bee, for F. Lewis Clark, Spokane, Wash. 37 ft. long; one 25-H. P. Standard motor.

Wooden launch Tekla, for Allesandro Faber, New York City; 90 ft. long; two 60-H. P. Craig motors.

Power catboat Vadmen, for Charles A. Welch, Cohasset, Mass. 21 ft. long; one 3-H. P. Palmer motor.

Wooden steam yacht Jule, for B. P. Cheney, Boston, Mass. 72 ft. long; triple expansion engines with cylinders 6½, 10½ and 16¾ in. in diameter by 9½ in. stroke; one Roberts boiler with 28 sq. ft. of heating surface.

One wooden launch for H. J. Parks, New York City. 30 ft. long; 8-H. P. Standard motor.

One wooden launch for C. H. Tyler, Boston, Mass. 83 ft. long; two

40-H. P. Murray & Tregurtha motors.

One wooden knockabout, for F. C. Welch, Boston, Mass. 31 ft. long.

One wooden Sonder boat, for H. E. Converse, Boston, Mass. 36 ft. long.

One wooden Sonder boat, for C. F. Adams, Boston, Mass. 35 ft. long.

One wooden launch, for William Lovering, Taunton, Mass. 83 ft. long; 100-H. P. Standard motor.

One wooden launch, for John C. King, New York City. 98 ft. long; two 100-H. P. Standard motors.

Wooden steam yacht, for G. G. Peters, Boston, Mass. 101 ft. long.

Wooden sloop, for C. K. Cummings, Boston, Mass. 60 ft. long.

Wooden auxiliary yawl, for J. H. Cromwell, New York City. 84 ft. long; one 40-H. P. Sterling motor.

One wooden launch, for S. Cochrane, New York City; 45 ft. long; one 25-H. P. Craig motor.

George C. Walker, Toledo, Ore.

Wooden steamer Truant, for the Modern Improvement Co., Toledo, Ore.; 60 ft. long over all; 33 gross tons; steeple double compound engines of 80 H. P. with cylinders 5 and 10 in. in diameter by 6 in. stroke; one Roberts boiler. Valued at $6,000.

Steam dipper dredge Chetco, for M. M. Davies, Eugene, Ore.; 88 ft. long over all; 160 gross tons; simple double condensing engines with cylinders 10 and 14 in. in diameter. Valued at $13,000.

One wooden auxiliary steam schooner for Capt. G. M. Walker, Portland, Ore.; 120 ft. long over all; 210 gross tons; 400 H. P. engines. Valued at $18,000.

Wooden steam derrick barge Shamrock, for the Modern Improvement Co., Toledo, Ore.; 70 ft. long over all; 60 gross tons; simple condensing engine with cylinders 8 and 12 in. in diameter. Boiler built by James Monks, Portland, Ore. Value, $3,000.

Gasoline boat Mud Hen, for M. M. Davis, Eugene, Ore.; 30 ft. long; 9 gross tons; 12 H. P. Imperial gasoline engine. Valued at $1,800.

One wooden barge 40 ft. long for M. M. Davis, Eugene, Ore.

One wooden barge 40 ft. long for P. Johns, Newport, Ore.

One wooden barge 40 ft. long for O. R. Altree, Toledo, Ore.

Wooden fishing schooner Passamaquoddy, for William Backus, Yaquina, Ore.; 52 ft. long over all; 24 gross tons. Valued at $4,800.

Canadian Machinery Co., Ltd., Levis, Que., Can.

Single screw compound engines for two ferry boats building by George T. Davie & Sons, Levis, Que.; also boilers for same.

Crawford & Reid, Tacoma, Wash.

Steamer Weiding Bros. 1908-1909, for Andrew Weiding, Seattle, Wash. 120 ft. long over all; fore and aft compound engines of 500 H. P. Valued at $45,000.

Steamer Daring, for Matthew McDowell. 106 ft. long over all; triple expansion engines of 250 H. P. Valued at $15,000.

Steamer Typhoon, for Torens Bros. 102 ft. long over all; Wells balance engines of 250 H. P. Valued at $1,200.

Gasoline boat Plover, for the Alaska Packers' Association, San Francisco, Cal. 75 H. P. Standard motor. Valued at $7,500.

Gasoline boat Governor, for C. A. Norton, Anacortes, Wash. 48 ft. long; 19 gross tons; 50 H. P. Imperial motor. Valued at $4,800.

Wooden scow for A. J. Weston, Olympia, Wash. 80 ft. long; 200 gross tons. Valued at $3,000.

Scow for Tacoma Barge Co., Tacoma, Wash. 85 ft. long over all; 250 gross tons. Valued at $3,500.

Henry Deibert Barge Building Co., Elkton, Md.

Wooden barge Katherine Dempsey, for Dempsey & Sons, Philadelphia, Pa. 202 ft. long over all; 466 gross tons. Valued at $16,000.

Wooden barge for the Southern Trans. Co., Philadelphia, Pa. 202 ft. long over all; 466 gross tons. Valued at $16,000.

Derrick lighter Mamie B. Patterson, for Charles Patterson, Philadelphia, Pa. 115 ft. long over all. Valued at $8,000.

Car float A. C. L. No. 13, for Atlantic Coast Line railway, Norfolk, Va. 165 ft. long over all. Valued at $10,000.

Barge Charles A. McCormick, for Charles H. Gallagher, Trenton, N. J. 120 ft. long over all. Valued at $4,000.

Wooden barge Lottie, for L. B. Shaw, Philadelphia, Pa. 195 ft. long over all; 442 gross tons. Valued at $15,000.

Hartford & New York Transportation Co., Hartford, Conn.

One wooden barge 150 ft. long over all, of 524 gross tons.

C. Hiltebrant, Rondout, N. Y.

Coal barge Janet Logue, for Muller & Logue, New York City. Wood construction; 100 ft. over all.

Wooden brick barge Richard W., for George Washburn, Rondout, N. Y. 114 ft. over all.

Wooden coal barge Crystal, for Mesick & Mesick, New York City. 115 ft. over all.

Wooden coal barge Ada R., for W. J. Roth Jr., New York City. 100 ft. over all.

Rebuilding hull of the wooden ferry boat A. F. Beach, owned by the Catskill Ferry Co., Catskill, N. Y.

The Kelly-Spear Co., Bath, Me.

One wooden four-masted schooner for stock. 187 ft. long over all; 750 gross tons. Valued at $52,000.

T. S. Marvel Ship Building Co., Newburgh, N. Y.

Steel screw steamer Dutchess, for the Newburgh & Fishkill Ferry Co. 160 ft. long over all; 500 gross tons; 700-H. P. double compound engines and Scotch boilers.

Steam screw steamer, for the New York Central railroad. 210 ft. long over all; 1,400 gross tons; 1,200-H. P. engines of the double compound type, with Scotch boilers, to be furnished by W. & A. Fletcher Co., Hoboken, N. J.

Steel sidewheel steamer, for the Lake George Steamboat Co. 230 ft. long over all; 900 gross tons; 1,400-H. P. beam engines with leg type boilers, to be furnished by W. & A. Fletcher Co., Hoboken, N. J.

James Rees & Sons Co., Pittsburg, Pa.

Steamer Egypt, 147 ft. over all, 175 gross tons, for an Egyptian irrigation company. Cross compound engines of 350 H. P.

Steamer Meddline, 170 ft. over all, 300 gross tons, for Cauca & Colombia Nav. Co. High pressure engines of 375 H. P.

Steamer Caldea, 170 ft. over all, 300 gross tons, for Cauca & Colombia Nav. Co. High pressure engines of 375 H. P.

Steamer Oregon, 75 ft. over all, 50 gross tons, for the Foreign Missionary Society. High pressure engines of 60 H. P.

St. Tammany Ship Yard, New Orleans, La.

Auxiliary schooner Wilhemina, 70 ft. over all, 60 gross tons, valued at $10,000, for Belanger's, Inc., Bluefields, Nicaragua. Standard gasoline engine of 50 H. P.

Four barges 100 ft. long, 200 gross tons, each, valued at $6,000 apiece, for the Jahncke Navigation Co., New Orleans, La.

One pile driver for the Illinois Central Railroad.

One 12-in. hydraulic dredge for the Jahncke Navigation Co., of New Orleans, La.

Southern Shipbuilding Co., Tottenville, S. I., N. Y.

Twin screw wooden steamer J. A. Ellison, for the Haverhill Steamship Co., Haverhill, Mass.; 168 ft. long over all; 1,100 H. P. engines and Almy boilers to be supplied by the J. W. Sullivan Co., New York City. Valued at $50,000.

Sea-going lumber barge of wood construction for the Cook-Cummer Steamship Co., Philadelphia, Pa.; 190 ft. long over all. Valued at $38,000.

Covered wooden lighter for New York owners; 90 ft. long, 30 ft. beam and 9 ft. deep. Valued at $6,000.

American Car & Foundry Co., Wilmington, Del.

Tug M. P. Howlett, for M. P. Howlett, Philadelphia, Pa. Length over all, 75 ft.; 100 gross tons; compound single screw engines; one Scotch boiler.

Car Float No. 43, for the Philadelphia & Reading Railway Co., Philadelphia, Pa. 186 ft. long over all; 800 gross tons.

Car Float No. 44, for the Philadelphia & Reading Railway Co., Philadelphia, Pa. 186 ft. long over all; 800 gross tons.

Nilson Yacht Building Co., Baltimore, Md.

Auxiliary skip jack for James L. Brese, Havre de Grace, Md. 51 ft. over all; 16 gross tons; 20-H. P. Van Auken four-cylinder horizontal motor. Valued at $3,500.

Gasoline tug for the Pennsylvania Railroad Co. 50 ft. over all; 15 gross tons; 60-H. P. Standard, four-cylinder motor. Valued at $5,500.

Gasoline yacht for Garnet Y. Clark, Baltimore, Md. 70 ft. over all; 35 gross tons; 125 H. P. Standard motor. Valued at $20,000.

Arthur D. Story, Essex, Mass.

One knockabout schooner fitted for auxiliary power, for the market; 116 ft. long over all; 106 gross tons. Hull valued at $7,000.

One knockabout schooner fitted for auxiliary power, for the market; 118 ft. long over all. Hull valued at $7,500.

A schooner fitted for auxiliary power, for the Atlantic Maritime Co., Boston, Mass.; 120 ft. long over all; 130 gross tons. Hull valued at $8,500.

Frederic S. Nock, East Greenwich, R. I.

Yankee II, wood, 45 ft. over all; 11 gross tons; approximate value, $4,500; single screw, six-cylinder 45-65 Sterling engine; for Miles L. Carter, Attleboro, Mass.

Raised deck afternoon cruiser, 60 ft. over all; 24 gross tons; approximate value $7,500; 30-40 H. P. gasoline engine; for E. P. Lawson, New York City.

Gildersleeve Ship Building Co., Portland, Conn.

Four coal barges for Louis Gildersleeve, 1 Broadway, New York. 116 ft. long over all; 500 gross tons each.

Four deck scows for Louis Gildersleeve, 1 Broadway, New York. 110 ft. long over all; 350 gross tons each.

One coal barge for Thomas Scully, 1 Broadway, New York. 160 ft. long over all; 1,000 gross tons.

J. M. Hammett, Marietta, O.

Steam stern wheel towboat Vulcan, with composite wood and steel hull, for the Vesta Coal Co., of Pittsburg, Pa. 160 ft. long over all; compound surface condensing engines; two sets, tandem; 12 in. high, 24 in. low, stroke 7 ft.; three boilers 38 in. in diameter by 28 ft. long. Valued at $45,000.

The Skinner Shipbuilding & Dry Dock Co., Baltimore, Md.

Steamer George L. Potter, for the B. & O. Railroad Co., Baltimore; 118 ft. 6 in. long over all; 220 gross tons; compound single screw engine with cylinders 20 and 40 in. in diameter by 28-in. stroke; one Scotch boiler 14 ft. in diameter by 12 ft. 6 in. long, with a working pressure of 150 lb.

Seaford Marine Railway Co., Seaford, Del.

Schooner George N. Reed, 173 ft. over all, 498 gross tons, valued at $38,000, for Capt. H. M. Bell, Seaford, Del.

Two masted ocean-going barge with 200 ft. keel, for the Valley Tie Lumber Co., Staunton, Va.

George T. Davie & Sons, Levis, Que., Can.

Two steel screw boats 146 ft. 11 in. over all, for the Quebec & Levis Ferry Co. Compound engines and boilers to be furnished by the Canadian Machinery Co., Ltd., Levis, Que., Can.

Union Iron Works, San Francisco, Cal.

Single screw steel passenger steamer Napa Valley, for the Monticello Steamship Co., of San Francisco; 240 ft. long over all; 2,100 gross tons; four-cylinder triple-expansion engines of 2,600 H. P.; four Scotch boilers.

Joseph Supple, Portland, Ore.

Wooden hull for stern wheel towboat for Willamette & Columbia River Towing Co., of Portland; 160 ft. long; 500 gross tons. Valued at $7,500. Machinery to be installed is taken from old steamer Garnecock.

Dubuque Boat & Boiler Works, Dubuque, Ia.

Side wheel steel transfer ferry Frisco, for the Frisco system. 305 ft. long, 1,104 gross tons; high pressure horizontal engines; four Lyons boilers, 72 in. in diameter by 18 ft. long. Valued at $225,000.

Peter Swanson, Belvidere, Cal.

Wooden towboat for E. E. Gross, Stockton, Cal.; 50 ft. long over all; 15 gross tons; 90 H. P. three-cylinder gasoline engine. Valued at $7,500.

The Portland Co., Portland, Me.

One towboat 99 ft. long over all, for the Central Wharf Towboat Co., Portland, Me.; 500 H. P. compound engines with cylinders 14 and 32 in. diameter by 22-in. stroke; one Scotch boiler. Valued at $40,000.

Oliver Reeder & Son, Baltimore, Md.

One wooden open harbor lighter for the Empire Coal Mining Co., Baltimore; 90 ft. long over all; 226 gross tons. Valued at $3,500.

J. T. Sharpley, Franklin City, Va.

Auxiliary schooner Surprise; 62 ft. long; 15 gross tons; 37 H. P. three cylinder gasoline engine. Value when complete, $2,000.

Percy & Small, Bath, Me.

Six-masted schooner Wyoming, 300 ft. over all; 3,730 gross tons; approximate value, $16,500; for stock.

The F. W. Pickels Co., Annapolis Royal, Nova Scotia.

A wooden three-masted schooner for their own use.

Sawyer Bros., Millbridge, Me.

Three masted schooner 150 ft. long and of 425 gross tons, for the market.

The G. G. Deering Co., Bath, Me.

One four-master schooner.

Bath Marine Construction Co., Bath, Me.

One raised deck cruiser 40 ft. in

length, 10 gross tons, for F. P. Baer, Los Angeles, Cal. Two Bath gasoline engines of 15 H. P.

One cabin cruiser 40 ft. in length, for Harry Dutton, of Boston. Gasoline engine of 60 H. P.

One raised deck cruiser 33 ft. in length, for Roger W. Peck, of Bristol, Vt. One gasoline engine of 15 H. P.

Six small open boats of from 16 to 25 ft., fitted with gasoline motors.

Lake Launchings During 1909

DURING 1909, exclusive of Canadian yards, lake ship yards launched 39 vessels, of which 17 were bulk freighters, 5 package freighters, 5 passenger steamers, 6 tugs, 5 lighters and 1 survey boat. Of this program the American Ship Building Co. built 20, 13 of them being bulk freighters, 2 package freighters, 2 passenger steamers, 2 tugs and 1 oil barge. The Great Lakes Engineering Works built 10, of which 3 were bulk freighters, 3 package freighters and 4 lighters. The Toledo Ship Building Co. launched 1 bulk freighter; the Manitowoc Dry Dock Co., 2 passenger steamers, 1 survey steamer and 1 lighter; Johnston Bros., a passenger steamer and a tug; John Bateman, a tug, and Laird & Son, a tug. The Collingwood Ship Building Co. launched the passenger steamer Waubic.

These 17 bulk freighters have a carrying capacity of 157,300 tons on a single trip or 3,146,000 tons in an average season. The freighters Alva C. Dinkey, Eugene J. Buffington, Alpena, LaBelle, Andrew S. Upson and John J. Barlum and the passenger steamer Tourist figured in the American Ship Building Co.'s program of construction as published in our Ship Building edition for 1909. Contracts for the bulk freighters Isaac M. Scott, G. A. Tomlinson, J. S. Ashley and the package freighter Conemaugh were let in the early spring and were completed and put in commission during the year. In addition, contracts for two tugs, the Courtney L. and Hollis M., for A. Booth & Co., were placed in the summer time and were completed and went into commission during the year.

During 1908, exclusive of Canadian yards, lake ship yards launched 39 vessels, of which 24 were bulk freighters, 2 passenger boats, 1 package freighter, 1 Canadian canal freighter, 3 tugs, 3 fire boats, 1 lightship, 2 drill boats, 1 sand sucker and 1 supply boat.

These 24 bulk freighters have a carrying capacity of 101,400 tons on a single trip, or 2,028,000 tons in an average season.

During 1907 the lake ship yards, exclusive of Canadian yards, launched 56 vessels of which 40 were bulk freighters, 3 package freighters, 1 passenger steamer, 1 wrecker, 1 lighter, 1 mail boat, 5 tugs and 4 scows. These 40 bulk freighters have a carrying capacity of 368,000 gross tons on a single trip. However, as one of the new steamers, the Cyprus, sank on her second trip, the net addition of that year was 361,000 or 7,220,000 tons in an average season.

During 1906 the ship builders of the great lakes, exclusive of the Canadian yards, launched 47 vessels, of which 40 were bulk freighters, 2 passenger steamers, 2 package freighters, 2 car ferries, and 1 sand dredge. The 40 bulk freighters have a carrying capacity of 381,000 tons on a single trip or 7,620,000 gross tons in an average season of 20 trips.

During 1905 the ship builders of the great lakes launched 32 steamers, of which 29 were bulk freighters, 2 package freighters and 1 car ferry. These 29 bulk freighters have 260,200 gross tons carrying capacity on a single trip or 5,204,000 gross tons in an average season of 20 trips.

During 1904 lake ship yards launched 13 vessels, of which 7 were bulk freighters, 2 package freighters, 1 car ferry and 3 passenger steamers. The 7 bulk freighters have a carrying capacity of 51,300 tons on a single trip or 1,026,000 in an average season of 20 trips.

During 1903 lake ship yards launched 50 vessels, of which 42 were bulk freighters, 5 car ferries and 3 passenger steamers. These 42 bulk freighters have a carrying capacity of 213,250 tons on a single trip or 4,265,000 tons in an average season of 20 trips. It should be stated, however, that 10 of these freighters were built by Mr. Wolvin for St. Lawrence river trade and are actively engaged in that service, but as they are available for the ore trade, they have been classed as bulk freighters with an average capacity of 3,000 tons each on 18-ft. draught.

During 1902 the lake ship yards launched 42 vessels, of which 32 were bulk freighters, 2 car ferries and 2 vessels for salt water service. These 32 bulk freighters have a carrying capacity of 171,910 tons on a single trip or 3,438,200 tons in an average season of 20 trips.

The particulars of vessels launched during 1909 will be found in the accompanying tables:

American Ship Building Co., Cleveland, O.

WHERE BUILT.	TYPE.	NAME OF VESSEL	LENGTH OVER ALL	CARRYING CAPACITY, GROSS TONS	NAME AND ADDRESS OF OWNER.
Lorain	Freighter	Alva C. Dinkey	600	12,000	Pittsburg Steamship Co., Cleveland, O.
Cleveland	Pass. Str	Tourist	85	.....	E. J. Dodge, Put-in-Bay, O.
Lorain	Freighter	Eugene J. Buffington	600	12,000	Pittsburg Steamship Co., Cleveland, O.
Wyandotte	Freighter	Alpena	374	5,000	Michigan Alkali Co., Detroit, Mich.
Lorain	Freighter	LaBelle	524	9,000	LaBelle Iron Works, Steubenville, O. M. A. Hanna & Co., Mgrs.
Cleveland	Freighter	Ardrew S. Upson	400	7,000	A. T. Kinney, Cleveland, O.
Lorain	Freighter	John J. Barlum	524	9,000	Postal Steamship Co., Detroit, Mich.
Wyandotte	Freighter	Benjamin Noble	256	3,000	Capital Transp. Co., Detroit, Mich.
Cleveland	Oil Barge	Forster W. Mitchell	142	.....	Petrol Traffic Co., Toledo.
Lorain	Freighter	Issac M. Scott	524	9,000	Virginia Steamship Co., Cleveland, O.
Wyandotte	Pkg. Frtr	Conemaugh	372	5,000	Erie & Western Transportation Co., Buffalo.
Lorain	Freighter	G. A. Tomlinson	524	9,000	J. J. H. Brown, Buffalo.
Lorain	Freighter	J. S. Ashley	524	9,000	Kinney Steamship Co., Cleveland, O.
Wyandotte	Pass. Str	Rochester	256	3,000	Richelieu & Ontario Nav. Co., Montreal, Can.
Lorain	Tug	Courtney L.	70	.....	A. Booth & Co., Chicago, Ill.
Lorain	Freighter	William B. Schiller	600	12,000	Pittsburg Steamship Co., Cleveland, O.
Lorain	Tug	Hollis M.	70	.....	A. Booth & Co., Chicago, Ill.
Lorain	Freighter	John P. Morgan Jr.	600	12,000	Pittsburg Steamship Co., Cleveland, O.
Lorain	Freighter	A. A. Augustus	524	9,000	Charles L. Hutchinson & Co., Mgrs. Pioneer Steamship Co., Cleveland, O.
Wyandotte	Pkg. Frtr	Octorara	361	5,000	Erie & Western Transp. Co., Buffalo, N. Y.

WHERE BUILT.	TYPE.	NAME OF VESSEL	LENGTH OVER ALL	CARRYING CAPACITY, GROSS TONS	NAME AND ADDRESS OF OWNER.
Great Lakes Engineering Works, Detroit, Mich.					
Ecorse	Freighter	Clifford F. Moll	464	8,000	American Steamship Co., Boland & Cornelius, Mgrs., Buffalo, N. Y.
St. Clair	Pkg. Frtr.	North Lake	372	5,000	Mutual Transit Co., Buffalo, N. Y.
Ecorse	Pkg. Frtr.	North Sea	372	5,000	Mutual Transit Co., Buffalo, N. Y.
Ecorse	Freighter	Shenango	607	12,000	Shenango Steamship Co., Cleveland, O.
Ecorse	Freighter	Stadacona	500	8,500	Inland Navigation Co., Hamilton, Ont.
St. Clair	Pkg. Frtr.	North Star	372	5,000	Mutual Transit Co., Buffalo, N. Y.
Ecorse	Steel Lighter	Ulster	125	.....	Dunbar & Sullivan Dredging Co.
Ecorse	Steel Lighter	Munster	125	.....	Dunbar & Sullivan Dredging Co.
Ecorse	Steel Lighter	Leinster	125	.....	Dunbar & Sullivan Dredging Co.
Ecorse	Steel Lighter	Connaught	125	.....	Dunbar & Sullivan Dredging Co.
Toledo Ship Building Co., Toledo, O.					
Toledo	Freighter	Denmark	460	9,000	R. P. Ranney, Pickands, Mather & Co., Cleveland, Mgrs.
Manitowoc Dry Dock Co., Manitowoc, Wis.					
Manitowoc	Pass. Str.	United States	215	1,298	Indiana Transp. Co., Chicago, Ill.
Manitowoc	Survey Str.	Engineer	150	.....	U. S. Government Engineers, Milwaukee.
Manitowoc	Pass. Str.	Alabama	250	.....	Goodrich Transit Co., Chicago, Ill.
Manitowoc	Lighter	————	140	.....	Chicago Lightering Co., Chicago.
Johnston Bros., Ferrysburg, Mich.					
Ferrysburg	Pass. Str.	Mackinac	150	.....	George L. Craig, Toledo, O.
Ferrysburg	Tug	Castenet	76	.....	Ranney Fish Co., Cleveland.
John Bateman, foot of Washington St., Buffalo, N. Y.					
Buffalo	Tug	George Edward	75	.....	Reger & Werner, Lorain, O.
Laird & Sons, Ashtabula, O.					
Ashtabula	Tug	Margaret Dahlmer	70	.....	Capt. John Dahlmer, Dunkirk, N. Y.

Record Work in Lengthening the Steamship Howard

WHAT is considered the quickest lengthening job ever done in this country, or perhaps anywhere, has just been completed at the yards of the John N. Robins Co., Erie Basin, Brooklyn, N. Y. The lengthened ship is the S. S. Howard, of the fleet of the Merchants & Miners Transportation Co., who operate a line of steamers between Baltimore, Savannah, Philadelphia and Boston.

The Howard is a steel, single screw passenger and freight steamer of the hurricane deck type, built in 1895 at Wilmington, Del., and, before lengthening, was of the following dimensions:

Length on deck	293 feet.
Beam moulded	42 "
Depth to main deck	26 "
Gross tonnage	2551 tons

The vessel has four decks, hurricane, main, lower and orlop. The loading and unloading was done, before lengthening, through two hatches forward and one aft; also through two cargo ports forward and one aft, on each side in upper 'tween decks, and one cargo port forward and aft each side in lower 'tween decks.

Accommodations for first class passengers are located on the hurricane deck and on main deck aft, on which deck is also the dining saloon. Second class passenger accommodations are located on the main deck abreast engine hatch.

The machinery consists of a triple-expansion engine with cylinders 28, 46 and 72 in. diameter by 48 in. stroke. Steam was furnished by four Scotch marine boilers, originally built for a working pressure of 160 lbs., all joined to a single smoke stack.

Ship had two masts, each having four shrouds and two backstays on each side, with topmast shrouds to spreaders at hounds.

Alterations Specified.

The following alterations were embodied in the specifications and carried out under survey of the American Bureau of Shipping, viz.:

Ship to be lengthened 40 ft. forward of engine room. New boilers of larger dimensions, with a working pressure of 170 lbs., built and installed, including piping, saddles, uptakes, larger smoke stack, and machinery completely overhauled. The two masts shortened 17 ft. and rigging changed, dispensing with top mast shrouds, one main shroud, and one backstay each side, the foremast being shifted aft 40 ft.

New section of 40 ft. was disposed of as follows: On hurricane deck, new accommodations for 32 first class passengers; upper and lower 'tween decks, freight space, with four new cargo ports; orlop deck and hold, freight space and new thwartship coal bunker. All decks, excepting hurricane, fitted with new cargo hatch and four additional cargo ports, fitted in upper and lower 'tween decks. Two new watertight steel bulkheads were built forward of boiler room, forming the cross bunker. Bilge keels were fitted for 95 ft. on each side and the hull was strengthened by doubling the shell plating on four strakes each side of ship, also by fitting four extra double angle keelsons on top of floors. New hawse pipes were installed for stockless anchors, and the ship's floors and frames in way of old boiler room were renewed. Three new Williamson hoisters were installed for the rapid handling of cargo, and extra life boats supplied, to conform with increased passenger accommodations. These, besides a number of other items to hull and machinery, consisted of the work to be done.

Working on her Afloat.

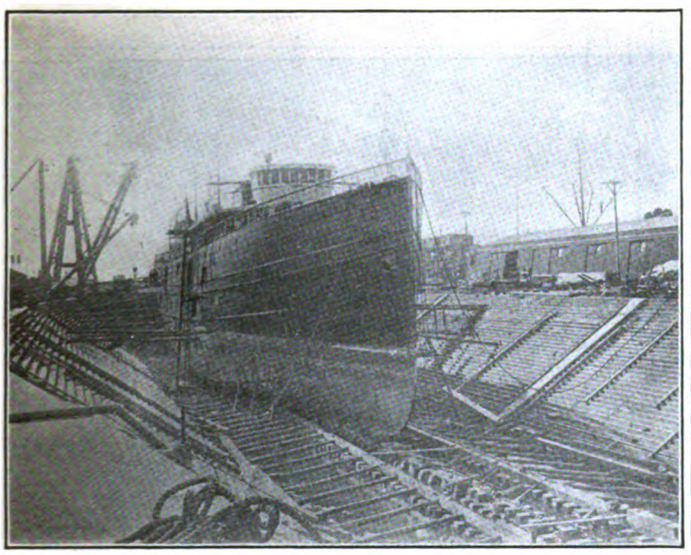
The S. S. Howard arrived at the yard of the John N. Robins Co. on Monday evening, Oct. 4, 1909. Work was started the following day. Boilers and masts were removed and ship was cut as far as practicable while still afloat. Considerable of the new work had been gotten under way, including the laying of lengthening ways, placing of winches in dock, etc.

A mold of ship's frames and floors having been made previous to her arrival at yard, therefore, all of the frames, reverse frames, floors, beams, hatches, bulkheads, port door frames, deck fittings, etc., were ready to go in place at once.

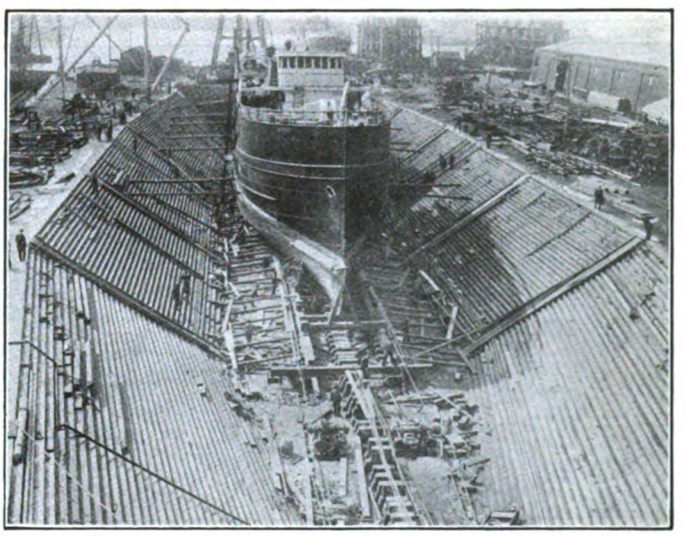
On Wednesday evening, Oct. 13, or eight days after arrival of ship at yard, she entered dry dock, and the following Friday, two days later, the ship was floated from dock, completely plated and all decks intact, having been *only 14 days in dry dock*. The bilge keels had also been fitted, bulkheads erected, and joiner work on new section considerably advanced. After floating ship, the boilers were installed and uptake and smokestack placed in position.

From then on the work was pushed with great rapidity and it was not until the ship had practically been completed that the journals and pins of main engine crank shaft were found to be defective, which necessitated the removal of shaft from ship and entirely rebuilding same. This extra work unfortunately caused the ship to remain at yard five days longer.

On Saturday, Nov. 27, at 2 p. m., the Howard left the yard under her own steam, complete in every detail, bound for Norfolk, Va., to take on passengers and cargo.



FIRST DAY, WEDNESDAY, OCT. 13.



SECOND DAY, THURSDAY, OCT. 14.

at 10:30 a. m., steam was turned on the winches and in 1 hour and 20 minutes the forward section had been pulled the required 40 ft. The actual pulling time was about 12 minutes, the delay being caused by the hook on port block, ship end, straightening after section had moved about 8 in. After another block had been substituted and ship moved several feet further, the same thing happened to the block on starboard side, which was also replaced with a new one, after which no more difficulties were encountered.

Plating Under Way.

Work of placing the frames was continued with at once and the day following the pulling of the ship all frames were in place and the work of plating was under way. On Wednesday, Oct. 27, at 4:30 p. m.,

As the contract time to lengthen ship and complete the work mentioned in specifications was 45 working days, it will be seen that this was exceeded by one day, or 44 working days to do the job, including the delay caused by rebuilding crank shaft, which otherwise would have been reduced at least 5 days, making the actual time 39 working days.

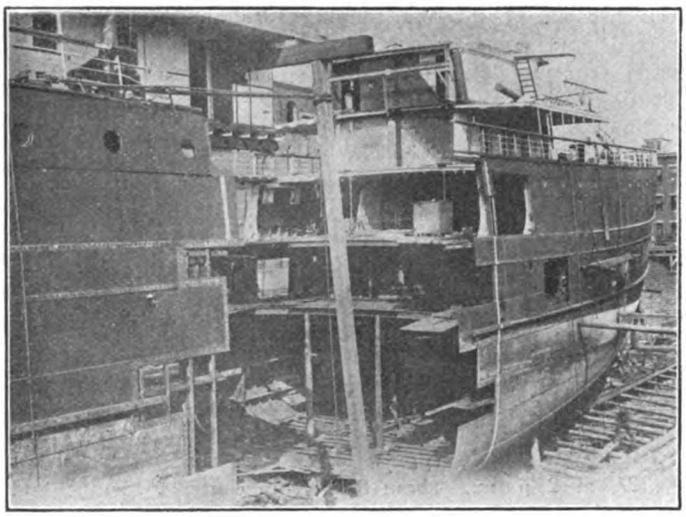
It may be mentioned that the steamship Juniata, a sister ship to the Howard, was lengthened by a southern firm, the specifications having been a duplicate of those for the Howard, but the time consumed was 90 days.

Constructing the Ways.

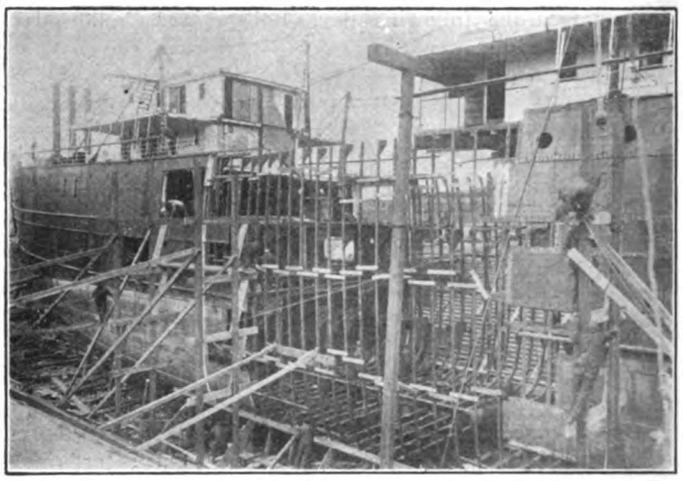
The ways were constructed as follows: Timbers 8 in. by 15 in. were placed athwartship across the floor of dock on each side and on a line with keel blocks. On top of these and running fore and aft, were two 10 in. by 12 in. timbers, extending full length of ways or from cut to about 18 ft. forward of stem. On these were placed another course of 8 in. by 15 in. timbers, also placed athwartship, all of which formed the foundation for ground ways, which were made up of 12 in. by 16 in. timbers, measuring 15 ft. 8 in. from center to center. Guide pieces 8 in. by 4 in. were spiked on outside of ground ways and shores placed extending from altar of dock to these guide pieces, and short shores from keel blocks to ground ways, to insure rigidity. The shores were spaces about 8 ft. from center to center, and consisted of piles measuring 9½ in. at heel and 7½ in. at ends. The sliding ways consisted of 10 in. by 14 in. timbers, extending from cut of ship to 7 ft. 6 in. forward of stem. Packing was placed on top of these ways and wedged tight. Thickness of packing was 3½ in. at cut and gradually rising to conform with form of hull. This packing extended to within 40 ft. from stem. Forward of packing were placed three 10 in. by 10 in. shores on each side, spaced 40 in. apart and tied firmly by means of chains passing under keel from shore to shore. Shores were also tied longitudinally by two 6 in. by 4 in. timbers, to which these chains were fastened.

To prevent sliding ways from spreading, three 1¼ in. tie rods were fitted from way to way, passing under keel and spaced about 9 ft.

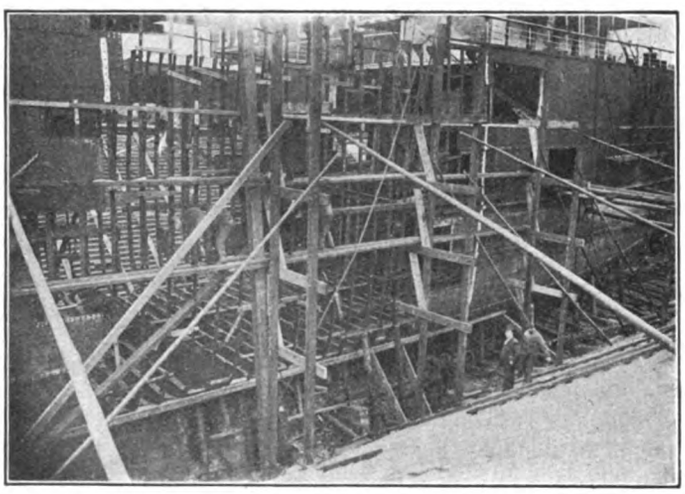
In order to hold bow of vessel perfectly rigid and prevent it from set-



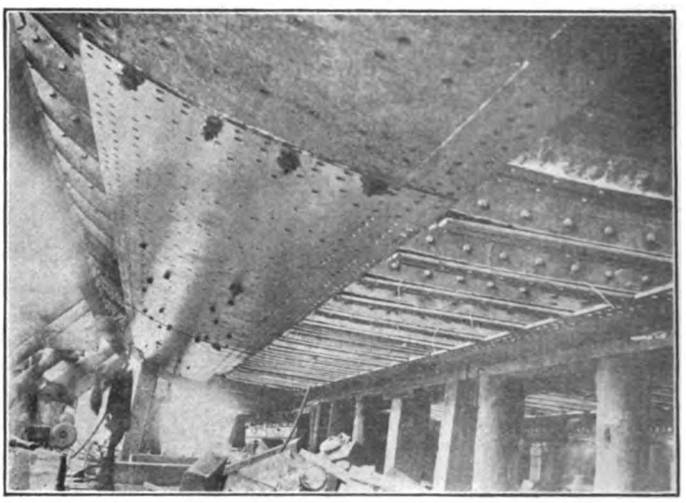
THIRD DAY, TUESDAY, OCT. 15.



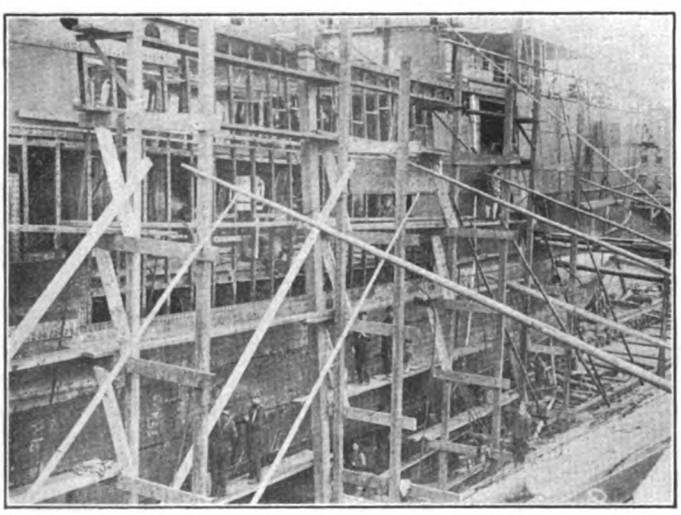
FOURTH DAY, SATURDAY, OCT. 15.



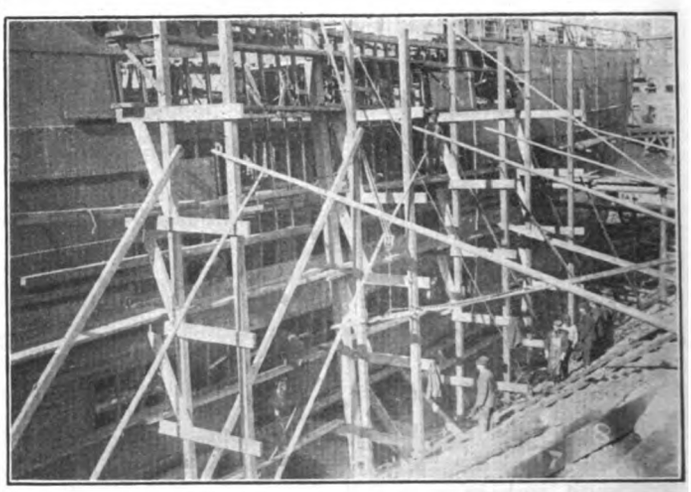
FIFTH DAY, MONDAY, OCT. 18.



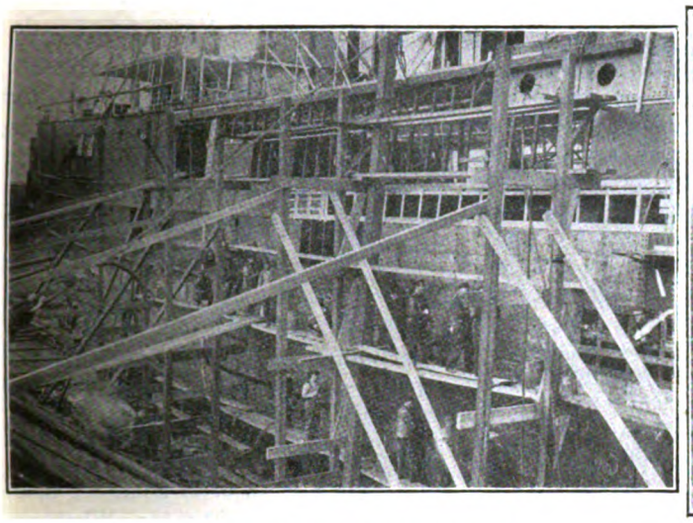
SIXTH DAY, TUESDAY, OCT. 19.



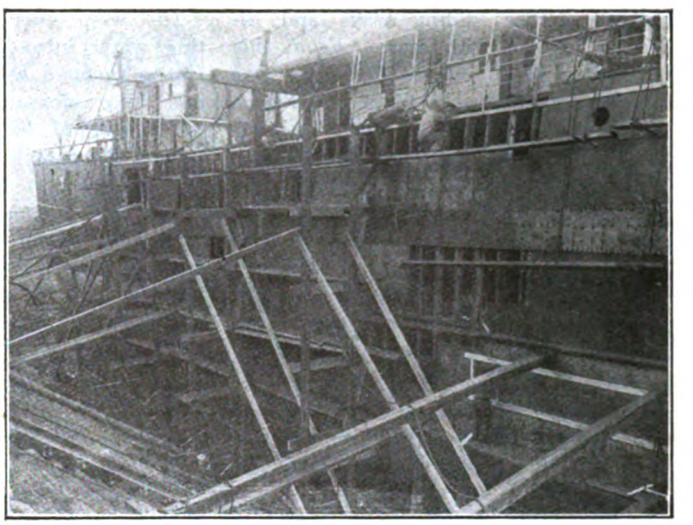
SEVENTH DAY, WEDNESDAY, OCT. 20.



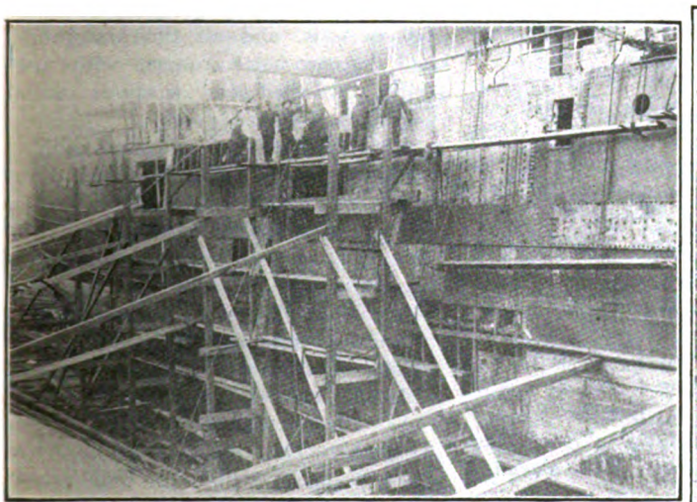
EIGHTH DAY, THURSDAY, OCT. 21.



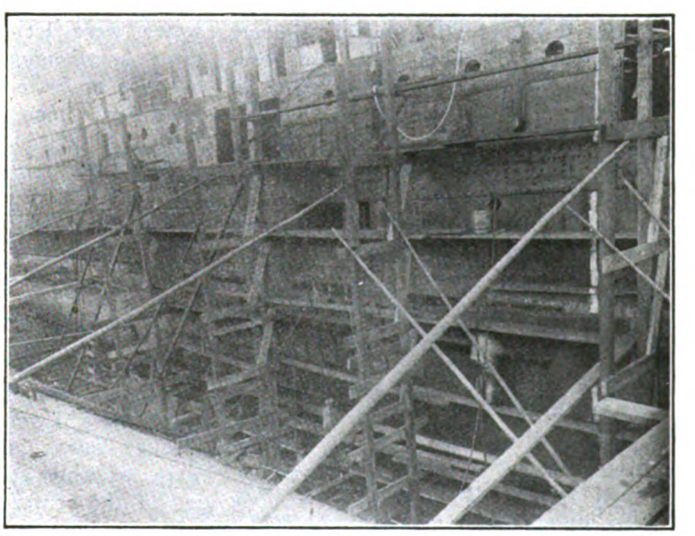
NINTH DAY, FRIDAY, OCT. 22.



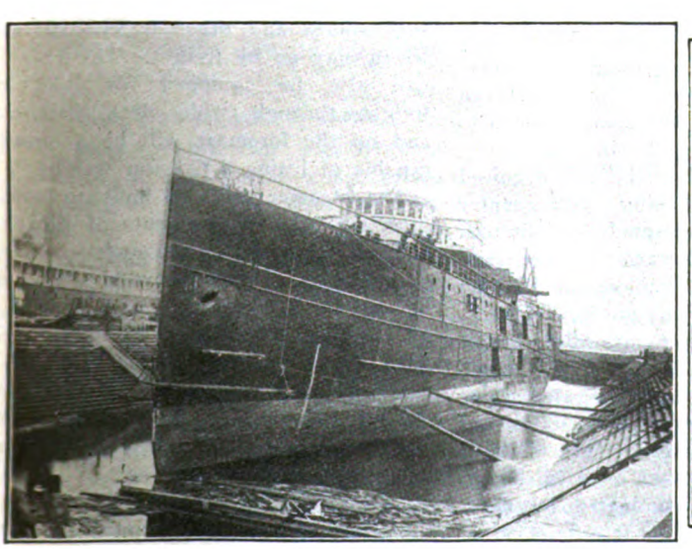
TENTH DAY, SATURDAY, OCT. 23.



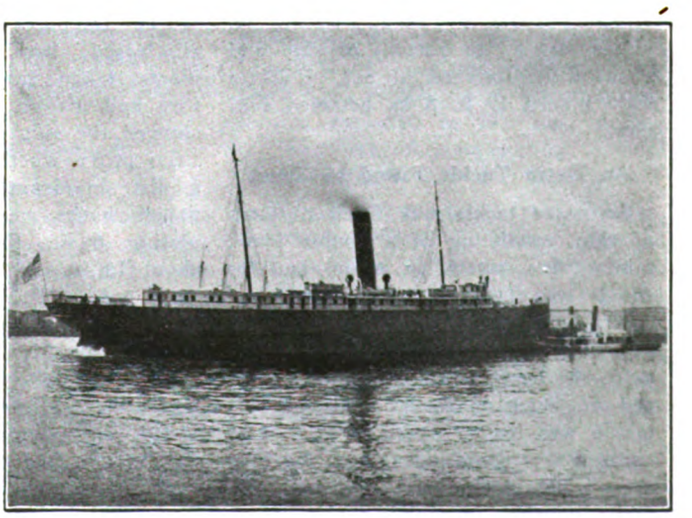
ELEVENTH DAY, MONDAY, OCT. 25.



TWELFTH DAY, TUESDAY, OCT. 26.



THIRTEENTH DAY, OCT. 27, LENGTHENED SHIP LEAVING DOCK.



S. S. HOWARD LEAVING THE SHIP YARD FOR NORFOLK.

tling, an A frame was constructed by means of a 16 in. by 16 in. timber, placed across sliding ways and directly in line with stem. From this timber a 10 in. by 10 in. shore was placed on each side of stem. Shores were spread 5 ft. 6 in. apart on timber and butting against angle clips, fastened to stem. Wedges were placed under cross timber on sliding ways, and the frame firmly wedged up. Stoppers, consisting of 15 in. by 12 in. timbers 8 ft. 9 in. long, were placed at ends of ground ways and through bolted. These stoppers were placed 40 ft. 2 in. from end of sliding ways, the 2 in. of extra length being made up by placing 2 in. wood liners against stoppers, as ship started to move.

Power for pulling forward section of ship was furnished by two 30 H. P. double cylinder winches, placed on foundations formed by three 12 in. by 15 in. timbers for each winch, placed fore and aft. Outside timbers taking hold of three dock floor timbers, and center one taking two; all through bolted with ¾ in. washer plates on under side of floor beams. After winches had been securely bolted to these foundations, two 9 in. by 10 in. shores were placed from floor timbers to winches, thus giving additional strength to take pull of tackle. The pulling gear consisted of two triple block tackles, having 5 in. manila rope falls. The blocks on winch end were fastened to a 16 in. by 16 in. timber extending across and butting against end of ground ways. This timber was securely lashed with chains to dock floor timbers and braced on the way end by two shores on each side. The blocks on ship end were held by means of 1¾ in. chains, which were attached to 6 ft. 18 in. by ¾ in. plates, riveted to bottom of ship and about 8 ft. forward of cut. Tackles were placed 19 ft. 8 in. between centers.

An Extra Tackle Fitted to Stem.

An extra tackle was fitted to stem of ship, consisting of a double plate, taking five rivets in stem and to which was fastened a wire pennant. A triple block tackle with 5 in. manila falls was attached to this pennant, the other end taking the anchor rod at head of dock. Fall of this tackle was led to a winch located at compressor room, next to machine shop. This tackle was not used. To assist winches in starting ship, three 125-ton hydraulic rams were fitted inside ship, which were operated simultaneously with the two winches.

The lining up process was as follows:

The ways were made level by letting water into dock to within a few feet of ground ways. At a given signal, four measurements were taken by means of battens at equal distances along each way, and from surface of water to top of ground ways. These eight battens were then measured and, taking the longest one for a point to work from, the ways were wedged up at all points to correspond with it.

To prove the keel was in line horizontally, battens were fastened to keel blocks on a level with surface of water and at intervals of 30 ft., and measurements taken from these battens to bottom of keel. These distances were taken, before pulling, after wedging up, and after pulling, and the keel was found in all cases to be perfectly level, horizontally. As a further proof, several feet of water were let into dock directly after lengthening, and battens were used to measure from water level to keel, four being taken forward and four aft, at 30 ft. intervals. The battens taken forward showed that ship had pulled on a perfectly horizontal line, while those aft showed substantially the same conditions as before lengthening.

Proving Alignment.

To prove alignment of keel in a thwartship direction, vertical lines were marked on a number of keel blocks before pulling. These lines were perfectly plumb and placed 6 in. off the center of keel in all cases. After pulling the ship, the points were measured wherever possible, and the section was found to be exactly in line at cut, but had moved ¼ in. to port at bow. This was eliminated by wedging. Measurements taken from a line stretched fore and aft on hurricane deck also showed the ship to be in line.

To prove whether the ship acquired a list in lengthening, two center punch marks were made on bottom plating 6 ft. forward of cut and about 13 ft. out from center line on each side. Before pulling, battens were used to measure the height from water level to these punch marks, and after pulling the same measurements were taken. It was found on comparing these battens that section had taken a ½ in. list to port, which was eliminated by shoring up and wedging.

The lining up process having been completed, the work of placing frames, etc., was rapidly advanced.

MORAN CO. TO BUILD NEW STEAMER.

On Dec. 23, The Moran Co., Seattle, was awarded a contract for the construction of a steel steamship for the Puget Sound Navigation Co., the cost of the new vessel to be about $175,000. The vessel will be ready for service on or before June 1, next, and will be placed on the run from Seattle to points on the Strait of Fuca.

The new vessel will be built on practically the same lines as the steamer Whatcom, now on the Port Angeles run, save that she will be of steel up to the passenger deck. She will have a speed of 14 knots an hour, a knot speedier than the Whatcom, and the new vessel's boiler will develop 250 lb. of steam against the Whatcom's 180 lb. The new steamer will have sleeping accommodations for 110 persons, and all the staterooms will be two-berth rooms, with specially furnished and spacious bridal chambers forward.

A large observation room with a plate glass front will be forward on the hurricane deck, similar in design to the observation cabins of the Princess boats of the Canadian Pacific railway, and the new steamer will contain all the improvements and inventions which the modern ship builders' art has brought to perfection, including wireless telegraphy.

As the freight business to be handled by the boat, in addition to the passengers, will be of importance, the construction of the vessel will follow lines which will permit of carrying a large cargo and the big side ports will be wide enough to admit automobiles and other bulky articles which may go by freight. The vessel will also be equipped for loading freight through wide deck hatches and on the foremast will be a boom capable of lifting a five-ton weight.

The steamer will be built to conform with the requirements of Lloyds and will class with that society along with the vessels constructed for use in the English channel and, in fact, all the lines of the new steamer have been drawn to approach in construction as nearly as possible, considering the trade she is to be engaged in, with the best class of English passenger steamers engaged coastwise. With her steel hull carried up over the freight deck the new vessel is expected to be able to go out in the worst weather along the Strait and keep up her schedule without interruption.

Ship Building on the Pacific Coast During 1909

By H. Cole Estep

THE president of one of the large companies engaged in steel ship building on the Pacific coast recently advanced the opinion that, speaking generally, there is but little opportunity on the western seaboard for the building of ocean going steel vessels at the present time. High wages, short hours and a high cost of raw material compared with Atlantic coast conditions place the Pacific coast on an unequal footing with the eastern yards. Ocean going vessels can be built on the Atlantic coast and delivered at San Francisco or Seattle at no greater expense than that required to deliver them at New York or Philadelphia. The expense of the costly voyage around Cape Horn can always be met by carrying a cargo; often the cargo can be made to pay a profit. Speaking further, however, he declared that this state of affairs need give the Pacific coast builders no cause for alarm. The coast is growing at a very rapid rate and the demand for small vessels of one kind and another, vessels up to 200 ft. in length and $200,000 in value, is constantly increasing. These boats cannot be profitably built in the east and brought around Cape Horn; they must be built on the Pacific coast, and it is to this class of construction that coast yards must look for their profits. He advised the local builders to specialize on the smaller craft, designed to suit the particular needs of western traffic and to leave the larger work alone.

The Year an Improvement.

A study of the 1909 ship building statistics of the Pacific coast seems to bear out this contention in every particular. The past year was fairly active and was a considerable improvement over 1908. Leaving out of consideration for the time, the small tugs, fishing schooners and power boats, which are built in the west in large numbers, we find that on the Pacific coast in 1909, 16 wooden and 13 steel vessels were either built or so far completed as to be considered a part of the year's work. The aggregate horsepower installed in the wooden boats is 4,675 and the steel boats 7,250. The aggregate value of the steel boats is $2,620,000 and of the wooden boats $606,000; the total investment in wooden and steel boats together being $3,226,000, and the total horsepower being 11,925. The average value of the wooden boats is $38,000 each and of the steel boats $200,000 each. The average horsepower of the steel boats is 550 and of the wooden vessels 290. The average length of the wooden boats is 125 ft. and of the steel boats 150 ft. The average statistics of steel boats are somewhat disproportionate on account of the four submarine torpedo boats being built by the Union Iron Works Co., San Francisco, and the Moran Co. ,Seattle, being included. These vessels are small and on account of their special nature and patented features are relatively expensive.

It will be noted that all of the boats under consideration are of a type that cannot be profitably built on the Atlantic coast and brought around Cape Horn.

The relatively large proportion of steel construction is significant. The west must be considered the last stand of the wooden vessel and while the number of wooden boats built on the Pacific coast is still greater than the number of steel boats the wooden crafts' lead is not very large. It will be noted that all the important vessels built during the year are steel. In a community where steel products are from 50 to 80 per cent higher than they are in the east and where clear fir lumber can be purchased for from $12 to $13 per 1,000 ft., this speaks eloquently for growing popularity of the steel ship.

Steamer H. B. Kennedy.

One of the most notable vessels built on the Pacific coast during the year was the steel passenger steamer H. B. Kennedy, constructed for the Port Orchard route by the Willamette Iron & Steel Works, Portland. This vessel developed the highest speed and the most horsepower of any boat built on the coast in 1909. It is also interesting to note that she was fitted with water tube boilers of an entirely new design, built by the Ballin Water Tube Boiler Co., Portland, Ore.

Three fire boats were built during the year, two for San Francisco and one for Seattle.

Among the notable wooden vessels of the year are the steamers Majestic and Hyak. The former was built by the Main Street Iron Works, San Francisco, and the latter by Joseph Supple, of Portland. The Majestic is 211 ft. long, fitted with 675 H. P. engines, and cost $130,000. The Hyak, which is the fastest wooden boat built during 1909, is 140 ft. long, equipped with 800 H. P. engines, and cost $75,000. She is owned by the Kitsap County Transportation Co., Seattle.

Government work on the Pacific coast in 1909 was only moderate in volume. The collier Prometheus received her finishing touches at the Mare Island navy yard, but is not yet ready for sea. No other western navy yard is engaged in construction work. At private yards two artillery tenders were completed and four submarine torpedo boats are under way.

Repair Work Plentiful.

Repair work was plentiful, particularly during the last few months when the revival of the coastwise lumber trade permitted a large number of coasting schooners which had been laid up, to fit out and put to sea. The Union Iron Works Co., San Francisco, is making very extensive alterations and repairs to the United States army transport Sherman; the Moran Co., Seattle, finished a large job on the H. B. Kennedy, while the repairs to the Norwegian steamship Eir by the Commercial Boiler Works and the Heffernan Dry Dock Co., Seattle, were the most extensive executed in the west during the past season, aggregating in cost over $78,000.

The Northwestern Iron Works, Seattle, builders of hoists, winches and auxiliary equipment, reports a good volume of business during the year.

The future is bright. The Union Iron Works Co., at San Francisco, is building a 20-knot steel passenger steamer for the Monticello Steamship Co., two duplicates of which are to follow; the Willamette Iron & Steel Works, Portland, is constructing several steel barges and has just laid the keel for a large, sea-going steel tug; the Moran Co., Seattle, is building a 252 ft. steel

schooner for the coastwise lumber trade, and on Dec. 23, 1909, was awarded a contract by the Puget Sound Navigation Co. for a new steel passenger steamer to cost $175,000.

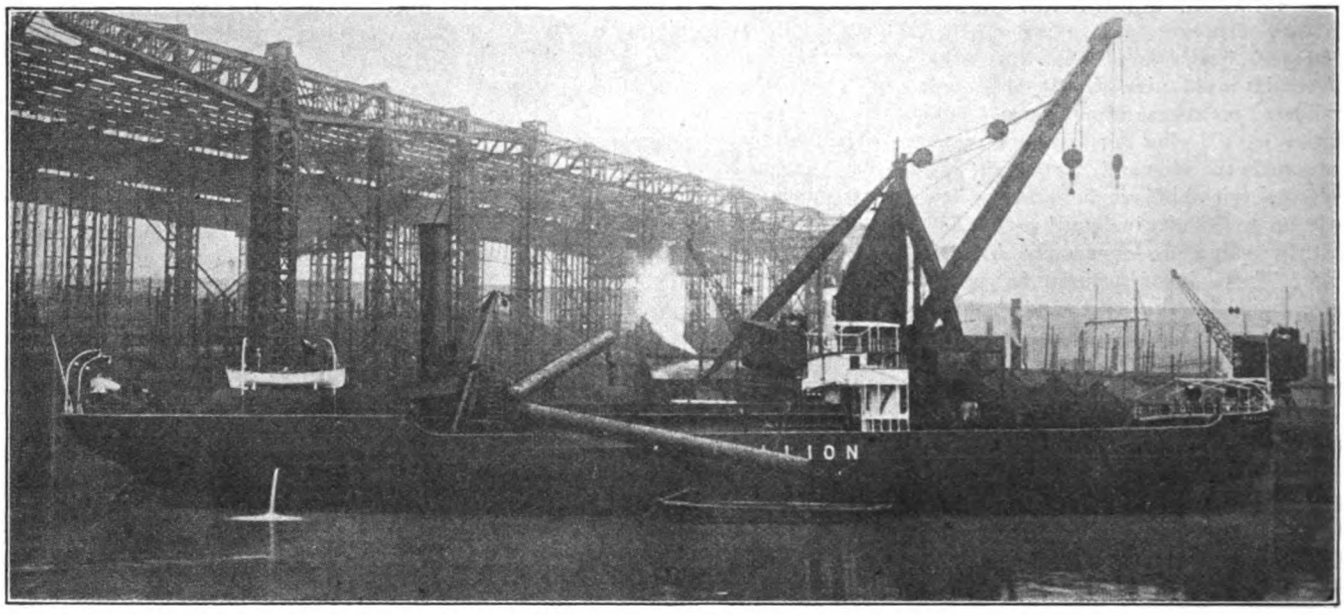
The revival of the coastwise lumber trade, which is the backbone of Pacific coast shipping, will stimulate the construction of a number of lumber schooners, both wood and steel, steam and sail, during the new year, thus greatly augmenting the tonnage built on the western seaboard during 1910. It is significant that no vessels were built for this trade during 1909. Should congress act favorably upon the Merchant Marine bill, it is almost certain that the two largest ship yards on the coast will be awarded contracts for trans-Pacific liners.

Self-Discharging Cargo Steamers---II*

A SYSTEM of belt conveyor discharge has recently been patented by William Doxford & Sons, Limited, and adopted in a new vessel—the steamship Pallion—which they have recently built at the Pallion ship yard, Sunderland, to the order of the Dunrobin Shipping Co., Ltd., of Newcastle-upon-Tyne, and of which they have supplied the following particulars:

This vessel has a length between perpendiculars of 270 ft.; a breadth, molded, of 44 ft. 6 in.; and a depth, molded, of 23 ft. 6 in. She is a single deck self-trimming steamer, with large hatches and subdivisions in the hold, and she has a carrying capacity of 3,100 tons on a 17-ft. 10-in. draught. The machinery, comprising triple-expansion engines, 21 in., 35 in., and 59 in. diameter by 39 in. stroke, and multitubular boilers working at 180 lbs. pressure, is placed aft. The cabin accommodation is fitted in the bridge, and the crew's space in the forecastle, while the navigation accommodation is about amidships. The after hatchways are extended by trunks to the poop deck level, and have been so arranged as to give the vessel a proper trim when loaded with full bunkers, and the usual high coamings are fitted on the poop deck and on the main deck forward.

The bottom of the vessel is constructed on the cellular system for a portion of the breadth, and the inner bottom is raised and sloped upwards in the wings and built into the sides of the vessel, forming a suitable incline for gravitating the cargo to the conveyors, and also giving the vessel the advantage of being about half loaded when in ballast and bunkers. In the center line is constructed a slope top cargo floor throughout the hold, and forming a tunnel extending from the engine space to the forepeak in which are placed the conveyor belts, of the Robins pattern, one on either side of the vessel. Over these conveyor belts are placed strong iron guide plates extending the full length of the hold and partially covering the belts, leaving a 24-in. hatch over a 36-in. belt. This space is covered in the holds by cross laid hatch covers 9 in. in length and 3 in. in thickness, which support the cargo clear of the conveyors. At the after end of the hold a portion of the hatch, over which the 9-in. hatch cover is omitted, is covered by a horizontal iron slide door, operated by a ratchet in the tunnel, which is of such a form as partially to protect the slide door from the cargo when loading, and in the floor of this projection of the chamber is fitted a flap hatch to give access to the hold from the tunnel. At the after end of the cargo space the conveyors rise from the horizontal and pass upwards in iron chambers through the machinery space, and thence into the conveyor-driving engine room, and discharge the load into guide shoots in the stern of the vessel which divert the load on to return belts, which are extended forward on both sides of the deck. In a simple form these conveyors would terminate at the end of the machinery space, or poop front, and the load would be delivered into sideshoots which telescope and are adjustable for loading barges on either side of the vessel, the shoots being suspended from derricks or other suitable means. In cases where the discharge is required at a higher



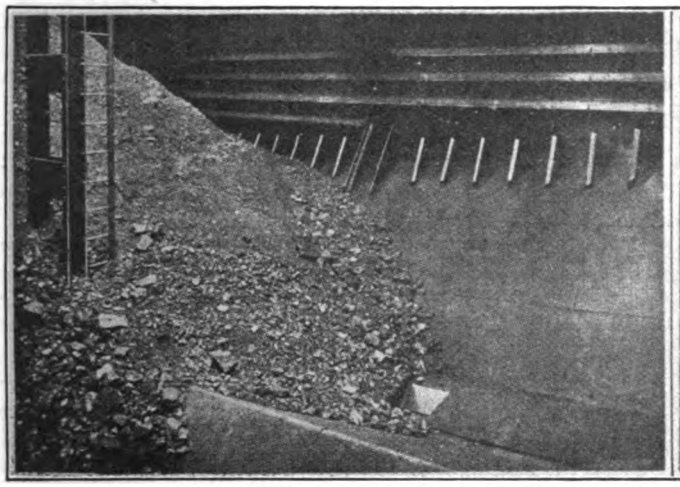
SELF DISCHARGING COLLIER PALLION, BUILT BY WM. DOXFORD & SONS, SUNDERLAND.

*No. 1 appeared in November number.

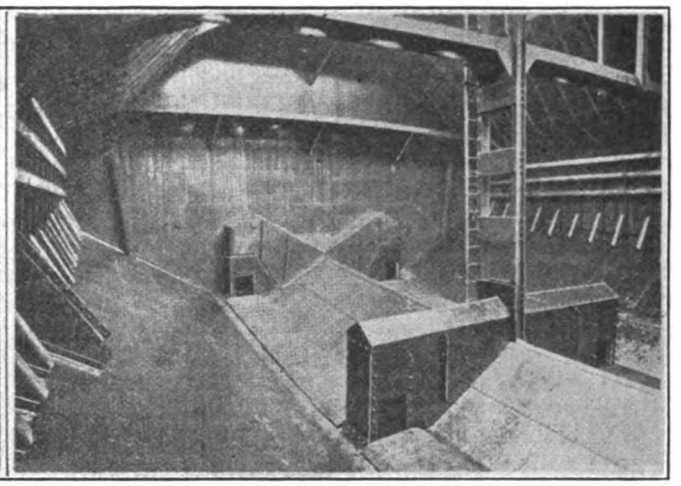
level than is attained at the poop front and a large range of elevation is necessary, as, for instance, for delivery on high quays into trucks and into barges alongside, the conveyors are carried forward and hinged at the poop front, and the delivery end is suspended by suitable tackle from twin masts or framework, and is raised or lowered according to circumstances, delivering the load into telescopic shoots suspended therefrom. When the delivery is into trucks, the "offside" belt delivers amidships into a cross conveyor suspended on the masts, which carries the load to the shore side and delivers by shoots into the trucks. A development of this principle has, however, been applied to the Pallion, as, in order to obviate the use of delivery shoots, which result in considerable damage, the terminal conveyors are carried in swivel booms, which are raised or lowered and swung overboard to the points of delivery, thus permitting of the cargo being conveyed direct to the truck or barge without shoots. These booms may also be swung across to the reverse side of the vessel so that both booms can deliver simultaneously into trucks or warehouse. Another important feature of this discharging arrangement lies in the method of delivering the cargo to the belts from the hold, and enabling the operator to have full control and free access at all times to the conveyors and to the face of the cargo. He may thus superintend and direct the continuous flow, and be in a position promptly to correct any tendency of the cargo to bridge or to choke the aperture leading to the belt, which being the smallest space the load has to pass through, insures a continued and uninterrupted delivery.

For unloading a coal cargo the following is the modus operandi:— Presumably the holds are full and the cargo lying solid, except under the overhang of the chamber on the bulkhead over the slide door, at which point the space is naturally only partially filled. The slide door in the covers over the conveyors is drawn back by the operator in the tunnel, and the loose coal over it immediately travels on to the conveyors, which may or may not have been started. If running, then the flow continues; if standing, no difficulty arises because the conveyor is only loaded at that point, and the aperture becomes blocked and only clears and flows when the belt is started. Then, if no "bridging" occurs, the after part of the hold is readily emptied on to the conveyor which is carrying it on deck and into the receiving trucks or barges. If, however, any "bridging" is threatened, the operator in the tunnel ascends to the chamber, and has free access over the aperture to correct any block. If bridging occurs higher in the hold, then he breaks it by means of a pinch bar and through prick holes in the chamber side. When the after end of the cargo has run to its natural angle of repose, the operator now in the hold merely removes the first cover and places it aft of the aperture, allowing another portion of the cargo to run, he being in a free position to maintain the run and correct any tendency to bridging and to abnormal rushes. If such do occur and incline to block the aperture, he again corrects this, and, having run so much more he removes the next segment of cover, and so on, gradually transferring the aperture from the after end to the fore end of the hold. The wing tanks and central tunnel being sloped, the cargo gravitates to the aperture and the finals are manipulated by the operator, one man being on each side of the hold.

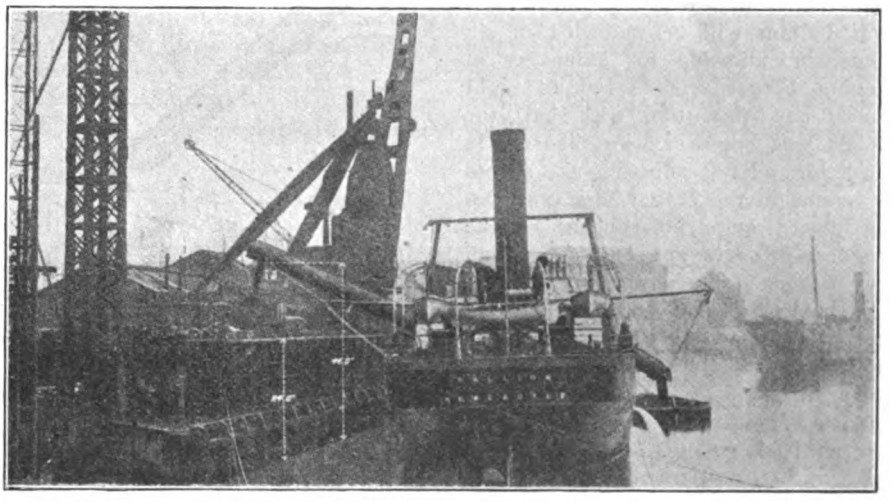
An important feature is the inclined shoot, over which all the cargo passes on to the belt. This shoot is carried on travelers on the guide plate sides and is moved by the operator in the



VIEW SHOWING OPENING OVER CONVEYORS.



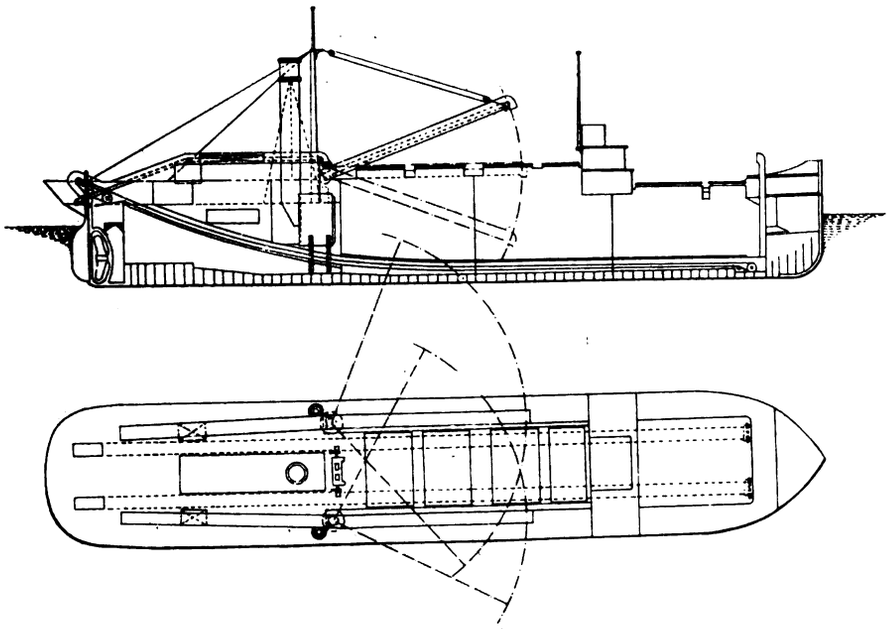
VERTICAL SLIDE DOORS IN HOLDS.



STERN VIEW OF PALLION, DISCHARGING OVER BOTH SIDES.

hold forward from stop to stop to correspond with the movement of the aperture, thus allowing two men to manipulate a whole cargo at the rate of 500 tons per hour. The conveyor-driving engines are of the compound surface-condensing type, worked from the main boilers, and are under the direct control of the engineer of the vessel, who has at all times free access to all the gear for oiling, overhauling, or adjustments. The driving engines are connected to the conveyors so that either can be run independently or simultaneously, the power arranged being sufficient to deal with a full load on both belts, delivering at the rate of 500 tons per hour. Accordingly, it is estimated that in regular working the steamship Pallion will be unloaded in six hours, or, allowing for stoppages in moving barges, etc., seven to eight hours, and this, too, with but one stoker, one engineer, two laborers in the hold, and two adjusting the shoots or booms in the craft. The gear, being placed quite independent of the cargo, is free to run empty, and all may be made ready and waiting for a start before the vessel is moored and the barges in position. This alone will save considerable time as compared with the work of rigging derricks, platforms, and the handling of baskets, etc.

The total cost of discharging the cargo of the Pallion will not exceed $60, including the upkeep of the gear; and it is affirmed that the cost of discharging a similar cargo at, for instance, the port of Hamberg, is about $560, and that in the work no fewer than 110 men are employed for about eleven hours under favorable conditions. The Pallion has 1,300 tons of water ballast capacity in her double bottom and wing tanks, and the pumps are capable of discharging 300 tons per hour. There is a complete system of signal bells fitted throughout the tunnel at the various discharge doors, which enables the officer on deck to control the supply on either or both sides of the vessel. The vessel is classed with the British Corporation Registry, Glasgow.



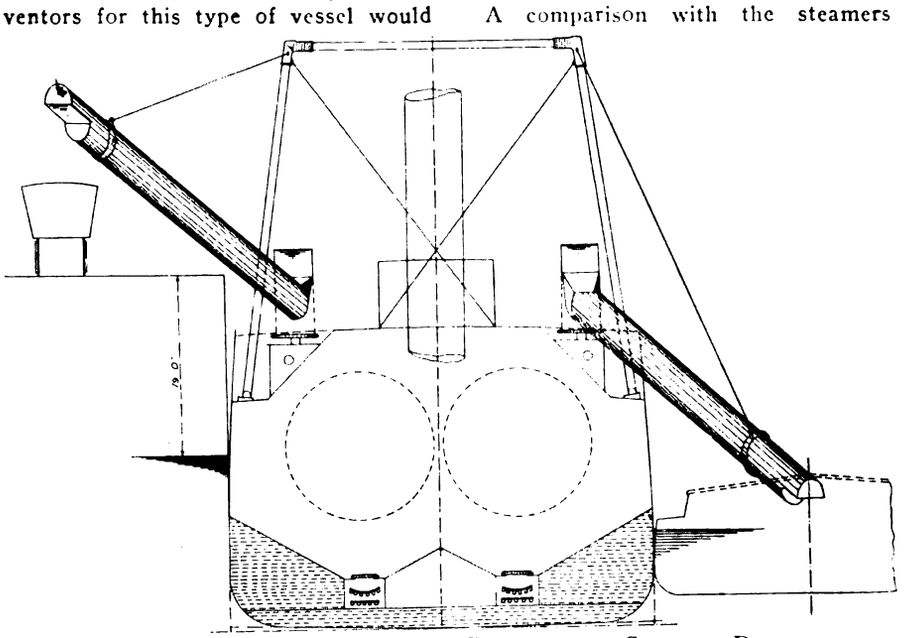
LONGITUDINAL SECTION AND DECK PLAN OF PALLION.

The advantages claimed by the inventors for this type of vessel would appear to be various. Harbor authorities will, it is urged, appreciate the accelerated despatch, as busy ports will be able to deal with a much larger import in a given area, and this will form an important factor as against the consideration of the probable increase of the harbor accommodation and facilities. Barge owners, again, will recognize the saving of time, and also the fact that the coal is delivered quietly from a reasonable height into the barge instead of being dropped in large grab loads, as is frequently done. Coal merchants and consumers will reap an advantage, as there is no great fall, and, consequently, a maximum of breakage or loss of weight.

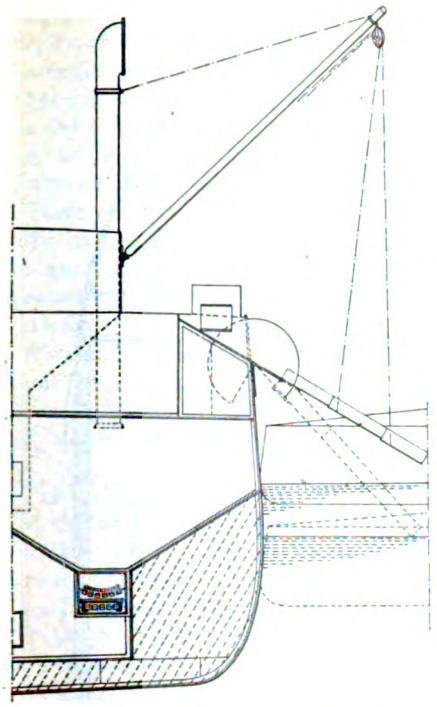
It should be here noted that the conveyors, while passing through the poop, are carried over two automatic weighers, each of which give the actual weight of cargo delivered. The central tunnel in the hold, being under somewhat similar conditions to a mine, is electrically illuminated and fitted with a ventilating fan and upcast ventilator at the fore end, which is of such size as to form an access shaft to and from the deck. The tunnel also has free communication with the machinery space by means of a watertight door. A liberal estimate of the cost of discharge would not reach the sum of 2 cents per ton, and at this cost the cargo is also weighed.

We also have information that the Pallion has discharged recent cargoes in eleven hours, which is considerably short of the estimated rate previously noted. The estimated rate of unloading with iron ore is 1,000 tons per hour.

A comparison with the steamers illustrated in the November number will be found interesting in many respects. The American design is earlier by over a year and was designed for stone principally although



SECTION SHOWING DELIVERY TO BARGE OR TO CARS ON DOCK.



HALF SECTION SHOWING METHOD OF USING DELIVERY SHUTES.

numerous coal cargoes have been also handled with equal success.

The flat slopes of the Doxford design are not suitable for stone which even on 40 degree slopes does not trim any too freely and this together with the greater height needed for the steel pan conveyors considerably reduces the capacity for coal cargo. In the American design it is never necessary to send men into the hold as the gates are all manipulated from the tunnel. The British design has undoubtedly an advantage for coal cargoes in carrying the incline through the machinery space aft, but for stone or ore this would be of no importance and the forward end arrangement is preferable and with the pilot house and navigation quarters forward it works out very well. It is certainly cheaper and there is no valid objection to locating the pilot house right forward in a slow ship at sea or elsewhere.

We are not advised as to whether the Pallion has carried any ore but certainly no ore with which we are familiar in this country will trim on slopes as flat as those shown, nor even very much steeper, as has been learned at considerable cost on the great lakes.

Steel Barges for Carrying Rock on the Columbia River

THREE steel barges, the plans of which are illustrated herewith, are being constructed for the Columbia Contract Co. by the Willamette Iron & Steel Works, Portland, Ore. The building of steel, flat bottom barges on the Pacific coast is a decidedly new feature. Heretofore the very low price of choice timber and the high price of steel has practically forbidden the use of anything but wood for barges and scows. Even at present, with steel considerably lower and lumber higher than it was ten years ago, the steel barges will cost 50 per cent more than wooden scows of equivalent dimensions and were it not for specially favoring conditions steel would be out of the question for the barges under consideration.

The barges are to be used for carrying rock to the jetty being built at the mouth of the Columbia river, and are towed to the jetty by a river steamer from a point a considerable distance upstream. Three barges are handled at one time by the tug, one being pushed ahead and one lashed on each side. The size and power of the tug and the conditions of navigation on the river limit the dimensions of the barges to about 150 ft. in length and 40 ft. beam. The largest of the steel barges under construction is 149 ft. in length, 37 ft. 4 in. extreme beam and 9 ft. 6 in. in depth. This barge has a capacity of 2,000,000 lbs. dead weight or 1,000 net tons. This is 100 tons more than the capacity of a wooden barge of the same dimensions, the steel craft being lighter. This increased capacity per trip justifies the increased cost of steel construction in this instance.

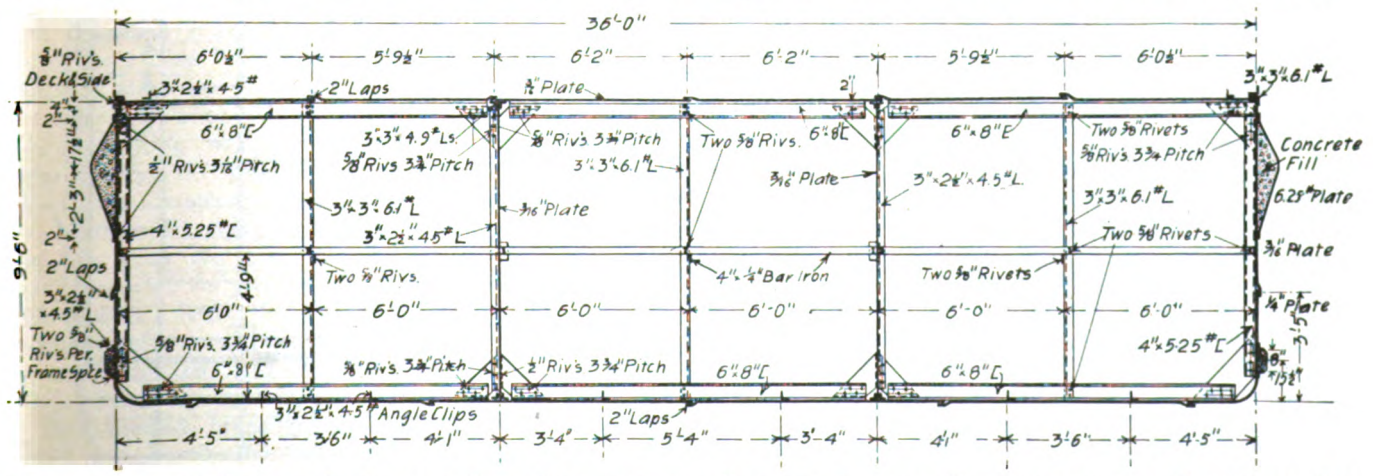
The total loaded displacement of the barge is 1,142 net tons, the weight of the hull alone being 142 tons and of cargo 1,000 tons. The ratio of cargo weight to weight of vessel is 7.04 to 1.

The framing, which is clearly shown on the accompanying cross section, is very simple. The frames amidship are spaced 2 ft. 6 13/16 in. The bottom frames are composed of 6 in., 8-lb. channels and the side frames of 4 in., 5.25-lb. channels, gusseted together at the turn of the bilge and also at the longitudinal bulkheads.

These longitudinal bulkheads, two in number, carry part of the weight of the deck load. They are built of 3 by 2½ in., 4.5-lb. angles, spaced on every frame, and gussetted to the bottom frames and deck beams; 3/16-in. plates caulked water tight and riveted to the angles form the complete bulkhead.

There are also four athwartship bulkheads similarly constructed, thus dividing the barge into 15 watertight compartments.

Between the longitudinal bulkheads are hold stanchions of 3 by 3 in., 6.1-lb. angle iron. These stanchions alone are unable to carry their load without buckling so they are tied in the middle with 4 by ¼-in. steel strips riveted to the frames and bulkhead stanchions. These strips not only prevent the hold stanchions from buckling, but also stiffen the longitudinal bulkheads and the sides of the barge.



MIDSHIP SECTION, LOOKING FORWARD, OF STEEL BARGE FOR THE COLUMBIA CONTRACT CO. BUILT BY THE WILLAMETTE IRON & STEEL WORKS, PORTLAND, ORE.

The deck beams are 6-in., 8-lb. channels covered with 3/16-in. plates, lap riveted and caulked. Over the deck plates is placed a wooden deck 4 in. thick.

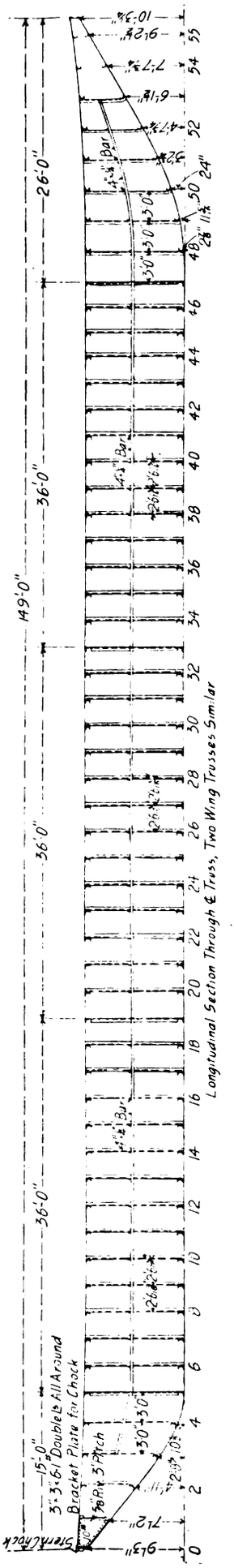
The shell plating is ¼ in. thick on the bottom and bilges and 3/16 in. thick on the upper side strake. A wearing strip of 4 by 8 in. fir is placed along the sides just above the turn of the bilge.

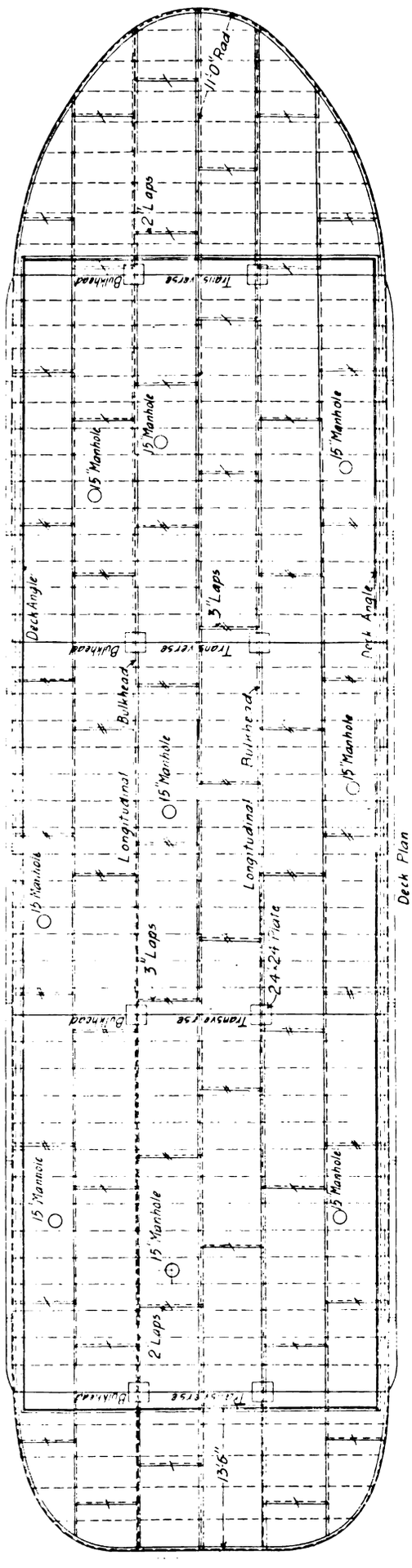
The upper guard is rather novel in construction. As is shown in the cross section, 3/16-in. plates are bent to form a flat A and riveted to the sides of the barge, the cavity behind the plates being filled with concrete. This forms a smooth, solid guard which the guard of the tow boat cannot break off.

The construction of the barge is very simple. It is sectional throughout. There is no sheer between the two extreme athwartship bulkheads. The rivet holes for the deck, side, and bottom plates are all punched on the spacing table.

Two hand bilge pumps pumping from each compartment are provided. Wooden posts, 6 in. square, will be set around the deck to take the chafing of the tug. Cleats for mooring tow lines will be bolted to the framing.

The construction throughout is as light as is consistent with strength. The barges are not built to go in rough water or to withstand careless handling. If they were beached, even on a soft bottom, the thin plating would probably be injured. They are, however, admirably adapted to the service for which they are intended and have unusual carrying capacity for their size.





LONGITUDINAL SECTION OF STEEL BARGES FOR THE COLUMBIA CONTRACT CO. BUILT BY THE WILLAMETTE IRON & STEEL WORKS, PORTLAND, ORE.

NEW TWIN SCREW FERRY STEAMERS FOR CALCUTTA.

John I. Thornycroft & Co. early in December, shipped from their Woolston Works at Southampton, four twin screw ferry steamers for the Port Commissioners of Calcutta for their passenger service.

About three years ago Messrs. Thornycroft delivered seven ferry steamers to the Port Commissioners for a new passenger service which they were inaugurating. These boats have proved so successful that Messrs. Thornycroft were given a further order for the four boats which are now being shipped. They have been erected at Woolston Works, properly marked for re-erection, and are being sent out by the Peninsular & Oriental Co.'s S. S. Pera.

The following are the leading particulars of these boats:

Length, overall	105'-0"
Length B. P.	100'-0"
Breadth moulded	20'-0"
Depth moulded	10'-0"
Draft (loaded)	5'-0"
Speed	12 knots
I. H. P.	500

The vessels are built of steel to

Lloyds A. I. (River Class) and Board of Trade requirements for special passenger certificate.

Special attention has been given to the subdivision of the hull, there being no fewer than seven complete watertight hulkheads.

There are two stout wood fender belts, one extending all round the vessel near the deck, and one from the forward to aft bulkheads near the waterline.

A wood awning extends over the whole of the upper deck and a navigation bridge, also with a wood awning, immediately in front of the funnel.

The machinery is placed amidships, and the arrangement of hull provides for four cabins for passengers, two forward and two aft, each with a roomy stairway and companion.

Teak battened seats are arranged on deck and in the cabins.

Nominally the vessel is to carry 200 passengers, but there is room for a considerably larger number.

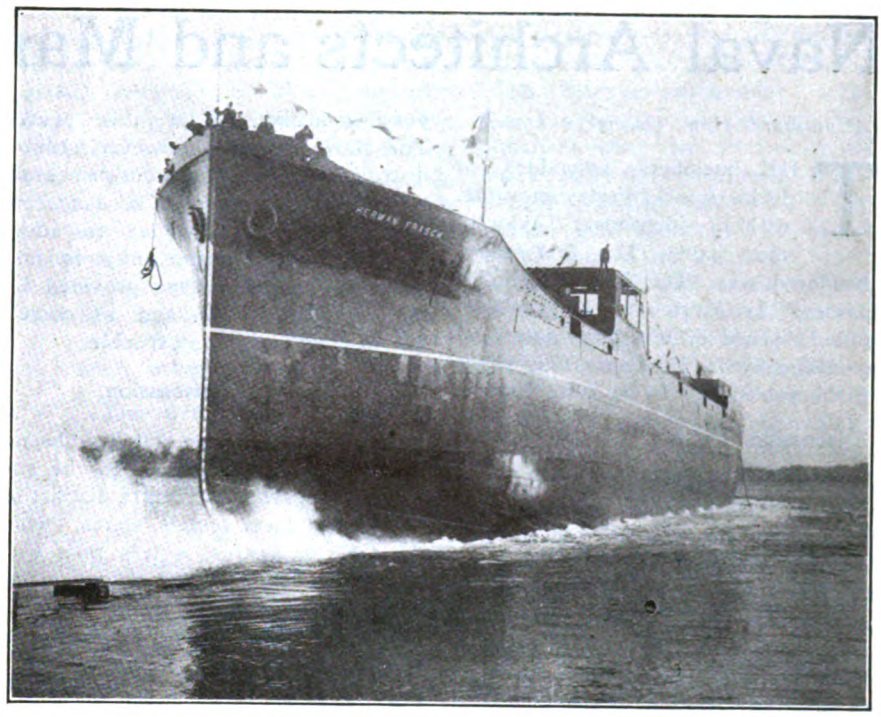
The machinery consists of two sets of tri-compound surface condensing engines, and a marine type boiler of extra large size to deal with the rather poor quality native coal, working with natural draft or when required with forced draft on the closed stokehold system.

The cylinders are 9 in., 13 in. and 20½ in. diameter, with a stroke of 11 in., working at about 300 revolutions per minute.

The boiler is 11 ft. 6 in. diameter and 10 ft. 3 in. long, with a heating surface of 1,267 sq. ft., and a grate area of 42 sq. ft., with a working pressure of 180 lbs. The boiler and machinery are in separate watertight compartments.

STEAMER HERMAN FRASCH LAUNCHED.

On Saturday, Dec. 11, 1909, there was launched from the yard of the Fore River Ship Building Co., Quincy, Mass., a steel screw steamer built for the Union Sulphur Co., of New York. The launching was witnessed by a large party of invited guests, the christening ceremony being performed by Master Herman Frasch Whiton, the five year old grandson of Herman Frasch, for whom the vessel was named. After the launching the company adjourned to the mould loft where luncheon was served. The tables were arranged in the form of a three-bladed propeller, the center round representing hub was decorated with the colors of the Union Sulphur Co., and the blade, with other colors.



LAUNCHING THE STEAMER HERMAN FRASCH FOR THE UNION SULPHUR CO. AT THE FORE RIVER YARD.

Chrysanthemums and American beauty roses were used in abundance and special souvenirs were provided.

The Herman Frasch is a single screw steamship constructed of mild steel to the highest class in the American Bureau of Shipping and British Corporation Registry. The vessel is of the single deck type constructed with Simpson patent topside tanks forming three large self-trimming cargo holds, each operated by twin hatchways having the De Russett patent covers.

The after part is built up to form a long poop with Liverpool house on top in which are berthed the engineer officers and their assistants. A short bridge with bridge house is arranged forward of amidships with quarters for the captain, navigating officers, saloon, chart room, pilot house, etc., while right forward vessel is built up to form a topgallant forecastle with anchor handling appliances.

The Herman Frasch has a straight stem and semi-elliptical stern, has the machinery arranged right aft, and is rigged with three pole masts, from the tops of the forward two of which there is rigged a wireless telegraphy outfit.

The vessel has been designed specially for the carriage and operation of bulk freight expeditiously, and for this purpose is fitted with kingposts operating twin booms on which is carried the Spencer-Miller patent marine transfer capable of discharging the cargo at a rate of over 300 tons per hour.

The machinery consists in a set of triple expansion surface condensing engines supplied with steam at 180 lbs. pressure by three single-ended marine type Scotch boilers, the installation being capable of developing sufficient power to propel the vessel loaded at sea at a mean speed of 10½ knots per hour. The Fransch's leading dimensions are:

Length overall	361 ft.
Length B. P.	345 ft.
Breadth	48 ft. 3 in.
Depth	30 ft. 0 in.
Draft	23 ft. 6 in.
Loaded displacement	8770 tons
I. H. P.	2100
Speed	10.5 knots

The steamer's construction was supervised by Jacobs & Davies, consulting engineers, 30 Church street, New York, under the direction of J. R. Gordon, traffic manager of the Union Sulphur Co.

The distinction of being the oldest vessel in commission in the world undoubtedly falls to the little Danish sloop Constance. Although she does not look old or old-fashioned by any means, yet she was built in the year 1723. Today she is still busy as a tramp between Danish ports, seldom failing to get her cargo of flour or lime, and carry it safely over the same Belts and sounds with which she has been familiar for 185 years. That this particular age is correct was stated by the Danish Bureau of Shipping only a short time ago.

Naval Architects and Marine Engineers

(*Continued from December Issue.*)

THE members assembled at 10:15 o'clock, Friday morning, with President-elect Taylor in the chair. The first paper considered was "The Design of Submarines," by Morley F. Hay, which, in the absence of Mr. Hay, was read in outline by D. H. Cox. This paper will be published later by THE REVIEW.

Discussion on Mr. Hay's Paper.

L. Y. Spear (Communicated): I regret that unavoidable absence from the meeting deprives me of the opportunity to hear the discussion of Mr. Hay's very interesting paper. In reading over the paper, a few comments have occurred to me, which it would seem proper to have brought out at the meeting. To that end the following short discussion has been prepared:

In connection with the question of the strength to resist deep submergence, it may be remarked that the navy department now requires the contractors to submerge all submarines to an axial depth of 200 ft., where they must remain for 10 minutes without developing any injurious permanent deformation. On the Atlantic seaboard, a large part of the work of the boats is necessarily done in water of less than 200 ft., and in this fact may be found an adequate reason for the adoption of this standard which is higher than that required by any European government. The tactics of the submarine boat will probably never require an actual submergence of more than 65 ft., but by disarrangement of machinery or errors on the part of the crew, greater depths may be attained involuntarily. While with the exercise of reasonable care and judgment, the chances of such involuntary deep submergence are very remote, nevertheless it should be provided for in view of the disastrous results which would follow the attainment of crushing depths. The adoption of this standard in this particular case removes at once all danger from this source over the greater part of the theater of the boats' operation. Moreover, the vessel possessing such strength is free to take to the bottom for repair purposes or for the conservation of the battery charge under circumstances where her presence on the surface is prohibited. For operation in very deep water, it is impossible to absolutely eliminate all possible danger from this source. The above standard, however, reduces it to negligible proportions, since the time required to reach a dangerous depth is so extended as to afford the crew ample opportunity to take advantage of the means provided for increasing buoyancy and to correct the original source of trouble.

Stability Discussion.

On page 5, in the stability discussion, the author referring to the single hull vessels in contra-distinction to the ship form vessels, states, "while the GM, in figures, is less than with the other type." In that connection it might be well to point out that the statement evidently refers to the GM in the surface condition, since, as is clearly indicated in other parts of the paper, the GM submerged of the single hull type is, as a rule, greater than that of the other type. In other words, while on the surface the ship-forms as a rule have a higher Gm; the process of trimming reverses these conditions.

On page 7 the author states, "It must be evident that the tactics employed in a naval war with vessels having such widely divergent qualifications must be entirely dissimilar." I find myself unable to give full assent to that statement. Taking things as they now stand, I fail to see how the possession of one or two knots additional surface speed can affect tactics so long as that surface speed is materially below that of capital ships and destroyers. It should always be remembered that the submarine boat, when driven on the surface with her heat engines, is in daylight devoid of any offensive or defensive properties, and daylight operations are obviously the special field of the submarine. To pass from the surface condition proper for maximum speed to the submerged condition requires from 3 to 6 minutes. Remembering this and taking into account the speeds of battleships, cruisers and destroyers, their armament, the range of the guns and the present perfection of marksmanship, it is perfectly obvious that the submarine has no business on the surface any where in the neighborhood of a hostile force. If she is to press her attack home, it is important that her presence should be undetected, and for this purpose as well as to avoid possible destruction, it is essential that she should pass to the fighting condition, i. e., the awash or submerged condition, outside the range of visibility.

Essentials of Attack.

This, of course, is just as true of a boat having a surface speed of 15 or 16 knots as it is of one having a speed of 12 or 13 knots. Once submerged their tactics are of the same general nature, but if the higher surface speed has been attained at a sacrifice of the submerged speed and radius, then, as can easily be demonstrated, the chances of a successful attack are reduced in about the same proportion. In other words, speaking generally, the surface speed can play no part whatsoever in battle tactics so long as it remains (as it must) materially less than the speed of capital ships and destroyers. General service conditoins, which need not be discussed here, call for a reasonable measure of surface speed combined with a radius of action suitable for the intended service. Any addition to such speed is necessarily made at a grave sacrifice of the really important qualities of the boat and can only result in a serious decrease in efficiency. It seems to me that the only exception to that rule is a special case where there are a number of comparatively narrow channels to be defended and the number of boats which can be assigned to such defense is limited. In this case, assuming the proper information service, the boats might be grouped at a centrally located base ready to take station at any threatened point. In narrow waters such as are here predicated, effective work might be done with a small submerged speed and radius, and it might therefore be permissible to make some sacrifice in these qualities in order to increase the surface speed and thus shorten the time required to reach the assigned station.

Table of Comparative Qualities.

Referring to the table of comparative qualities on page 9, the author's statement is strengthened by the consideration of the trial results of a single hull boat of later design than Type 9, where, on a displacement slightly in excess of 300 tons and a horsepower of 600, a surface speed of 13.3 knots has been achieved. These results place that type of single hull vessel midway between the two types of double hull mentioned. It might also be added that, with regard to

the 13 knot Laurenti boat, the actual combined brake horsepower of the engines, as shown by shop tests, was 900 instead of 750 as given. The difference in speed therefore may be very largely attributed to the excess in power. As a matter of fact, it would be entirely possible, employing the same power, to drive a suitably designed single hull vessel to as much as 14½ knots, and it is possible that this could be done without so great a sacrifice of submerged qualities as has been made in the case under discussion. However that may be, the point I wish to make is that the attainment of comparatively high surface speed is probably not so much dependent upon the adoption of ship-form hull as it is upon the sacrifice of the submerged speed and radius. If that be the case, it is by state, the submarine will necessarily take on ship-form or some modification thereof. I also very much doubt whether uniformity of type is to be expected before the distant future. The various possible constructions for submarines and their fittings and appliances, has been made the subject of a great many patents, and it is along the line of the most important of these patents that the various designers and builders are developing. Thus, aside from conflicting opinion as to the relative merits of the various systems of construction, the business situation would appear to operate against uniformity of design. Certainly such a result could not be attained in the near future without the formation of that monster, abhorred by all good voters—a trust.

Discussion by Mr. Chase.

Mason S. Chase (Communicated): Important differences of opinion, owing to different points of view, will probably long continue to agitate the question of what is the best combination of compromise to make in "under water torpedo boats," including armament, surface and submerged speeds and endurances, seaworthiness and habitability, also the element of "safety" or "danger" peculiar to submarine navigation.

The many varying opinions expressed are largely due to lack of any actual war experience with these vessels. Probably a war betwen two first-class naval powers, both provided with submarines of different classes and types, is necessary to enable the services and performances of these vessels to be analyzed and compared, and to settle many mooted questions, even if not to bring about uniformity of ideas. Such war experience would shed much light on the different lines of development for submarine designers to follow, and, perhaps, at the same time, lead to the evolution of a new type of battleship which would be better protected against the arms of underwater warfare than the present type of battleship is protected. We must not forget that submarines are primarily designed to fight battleships, although of course they may be called upon to engage other vessels.

The Dreadnaught Type.

The present type of battleship of the "Dreadnaught" or "Super-Dreadnaught" class, is a vessel of high speed, large endurance and heavy armament, especially fitted for long range fighting and to carry on offensive operations at a considerable distance from its base. Plenty of searoom, with deep water, is required to maneuver a fleet of these vessels. It is not at all probable that fleet actions between such ships, practically unprotected as they are from total extinction by large explosive mines and much more vulnerable to the attacks of torpedoes than to those of artillery, will take place at the entrance of harbors, or roadsteads, in the immediate vicinity of the coast.

The experiences gained in the use of explosive mines in the Russo-Japanese war, and the facility with which mines can be laid in roadsteads and in the vicinity of harbors combined with the use which coast defense submarines can make of the latest improved automobile explosive torpedoes, as well as the more recently invented automobile projectile-firing torpedoes, all tend to restrict fleet actions to the high seas.

Aerial Navigation.

It must be admitted that aerial crafts are now also capable of rendering valuable service in coast defense operations. We may expect to see aerial navigation considerably modify, or even completely change methods of conducting war on both land and at sea. The recent advances in aerial navigation have been so marked, and the services which aerial craft can render in warfare as scouts and as engines of destruction, are too numerous and obvious for their possible use in warfare to be ridiculed or belittled. Both aeroplanes and dirigible balloons can now travel, weather permitting, from the continent of Europe to England and return, and are already capable of rendering valuable war services in the immediate vicinity of the coast.

I believe that while harbor and coast defense submarines, such as those at present in service in the American navy, will materially aid in coast defense operations, within a limited radius, aggressive warfare against battleships, at sea, will have to be carried on by large sea-going submarines of high surface speed, or tactical speed, combined with large endurance, and improved habitability. Of course, with these qualities must be combined sufficient under-water speed and endurance. Opinions differ widely as to what constitutes sufficient under-water speed and endurance. The submarines of today can best be developed into effective ones for sea service, by holding to, or limiting, the submerged speed, and increasing the surface speed.

Increase in Displacement.

Submarines of a displacement of over 500 tons have already been built and some of a displacement of over 800 tons are under construction, and a displacement of 1,000 tons is being rapidly approached. The English submarines have already attained a surface speed of 15 knots combined with a submerged speed of over 9 knots. The French boats, in service, have attained over 12 knots surface speed, and about 8 knots submerged speed. The larger French vessels, under construction, are designed for a surface speed of 15 knots; I have not seen any statements as to their submerged speed.

There are some elements which enter into what Mr. Hay calls the "safety" factor which he has not mentioned, and there are others the importance of which may be easily exaggerated.

Submergence Tests.

I believe that the importance of deep submergence tests is often exaggerated, and that the ability of one vessel to submerge deeper than another is only an important element of safety under exceptional circumstances. If a vessel will always navigate in water of a limited depth, of say 200 ft., then there would be an excellent reason for building and testing her for 200 ft. submergence. If, on the other hand, greater depths are to be navigated over, and a vessel designed to submerge 200 ft. sinks in water which is 500 ft. deep, for example, the "safety" factor due to strength of hull will suddenly vanish when 200 ft. depth is reached, and the vessel will collapse. I think

that generally sufficient strength to submerge 150 ft. is satisfactory. Probably the minimum risk from sinking is obtained by a combination of high-pressure blow-out tanks, sub-division into a number of water-tight compartments and a safety drop keel. This combination is not a new one, but one which already exists. Vessels so constructed can be saved from sinking if one, or even perhaps two, compartments are thrown open to the sea. Recent large submarines of the Holland type have heavy keels, and it would be interesting to know if all of this outside ballast is necessary to insure their stability. If this ballast is not all necessary for stability, what fraction of it could be utilized for a safety drop keel, if desired? The amount of reserve buoyancy with which the vessel submerges is also an element of safety, but this is generally quite small, less than one-half of one per cent of the total submerged displacement.

Double Hull and Single Hull.

The designation of submarines as "double hull" and "single hull" to differentiate between those that have a comparatively large emerged displacement for surface running in per cent of the total displacement when submerged, and those which have a smaller per cent of submerged displacement, does not seem to be an accurate way of designating the two different types of vessels. I do not think that any submarine vessels haave a complete "double hull," one water-tight and capable of resisting high pressure, and the other non-water-tight. The first published midship section of the French so-called "submersible" Narval certainly showed this "double hull," but I have been told on good authority that as finally constructed the light exterior tanks of the Narval, which are empty when the vessel navigates on the surface, did not extend completely around the vessel. The Narval was designated as a "submersible" owing to the fact that the emerged displacement for surface navigation, in per cent of the total displacement, was much larger than in previous under-water torpedo boats which had been designated as "submarines." In the Narval this emerged displacement for surface running was about 40 per cent of the total displacement when submerged. The construction of the Narval marked a great advance in the seaworthiness of under-water torpedo boats, and paved the way for the development of the under-water torpedo boat into an able sea-going vessel. The program for the design of the Narval was due to Monsieur Bertin, the eminent French naval constructor, who was chief constructor of the French navy when the Narval was built. To Naval Constructor Laubeuf, of the French navy, belongs the credit of developing the design of this vessel.

Underwater Torpedo Boats.

Today it is difficult to divide under-water torpedo boats into the two classes of vessels, "submarines" and "submersibles," by differentiating one class from the other by the amount of emerged displacement for surface running in per cent of the total displacement, and the consequent greater or lesser development of the non-water-tight superstructure. It remains for the best per cent of emerged displacement for different services to be determined on the principle of the survival of the fittest. Certainly for the sake of durability the non-water-tight superstructure should not be developed to such a point that it can be "punctured by a boat hook," as Mr. Hay tells us. Fortunately the use of such extremely thin superstructure plating is generally avoided. Sufficient emerged displacement in per cent of the total displacement not only permits higher surface speed to be obtained and favorably influences behavior in rough water, but also constitutes an element of safety, owing to increased buoyancy, when the vessel is propelled at high speed on the surface, and in case of collision. These good qualities are obtained at the expense of some increase in resistance when submerged. The control of submerged running is not necessarily unfavorably affected.

The Krupp Type.

The present Krupp type of boat, which Mr. Hay mentions, has a very broad, low superstructure which tapers off to nothing at a considerable distance below the water line where it meets the circular water-tight hull. The conditions of stability of the Krupp type, either on the surface, or when submerged, are not typical of the best that can be obtained in a vessel with an emerged displacement for surface running of only 16.7 per cent of the total displacement submerged. A wide, flat superstructure, the width of which considerably exceeds the diameter of the hull, would undoubtedly be largely accountable for the "broaching to" when turning submerged, to which Mr. Hay refers.

If we take the published dimensions of one of the Laurenti boats, La Faca, as correct, we find that this vessel, which is designated as a "submersible," is 140 ft. long, displaces 185 tons when running on the surface and 235 tons when submerged. The emerged displacement for surface running is then 50 tons, or 21.3 per cent of the total displacement. If we also take the published dimensions of the submarine Octopus, of our navy, 106.5 ft. long, 238 tons surface displacement and 275 tons total displacement, when submerged, we find that the emerged displacement for surface running is 37 tons, or 13.5 per cent of the total displacement. I wish that Mr. Hay would correct me if I am in error, for I do not see why he speaks of the boats of the Laurenti type as having an emerged displacement for surface running of 60 per cent. The emerged displacement of these Italian boats of about 20 per cent is practically the same as that of the recent large French boats, and somewhat in excess of that of the British boats which I understand is about 15 per cent. It would seem to me that we may expect to find less and less difference in this percentage of emerged displacement in the boats of the future.

A comparatively large ratio of length to beam of approximately 10 favorably affects surface propulsion, without affecting unfavorably submerged running, and is being generally adopted in all types whatever may be the per cent of emerged displacement.

Inefficiency of Hydroplanes.

The question of the number of rudders employed in different cases seems to be given undue importance. Hydroplanes, located amidships, seem to be notably inefficient and to require very large power to operate them. I understand that a few years ago amidship hydroplanes were experimented with on one of the Holland boats in spite of the fact that the company which builds these boats is a strong advocate of stern rudders only. For this company to have considered hydroplanes, even experimentally, would seem to indicate a spirit of tolerance on the part of some submarine builders which may help to bring about greater uniformity of ideas. No submarine has yet run submerged in equilibrium, or an even keel, whatever the disposition of rudders. Experiments have shown that submergence can be ob-

tained in many boats which have both bow and stern rudders at a smaller angle of inclination that with boats which have stern rudders only. With this comparatively unimportant difference, the same "stunts" can be performed with either disposition of rudders. I do not see that the maximum speed limit submerged, for which Mr. Hay refers us to the paper on "The Stability of Submarines," by J. G. Johnstone, is likely to be dangerously approached. Mr. Johnstone places the speed limit for stability of motion in a British submarine of 310 tons submerged displacement, fitted with stern rudders, and a value of B. G. of 1 ft., as 22 knots.

Mr. F. W. Baker's Discussion.

Frederic W. Baker: I am sure that the author of this most interesting paper should be congratulated on having handled a very difficult subject in such an able manner. I say "difficult subject" because owing to the great secrecy maintained in regard to submarine construction no one person could expect to become familiar with all the different principles and details of construction which are incorporated in each of the several types of submarine boats.

A person may become familiar with the construction and method of handling a certain type of submarine boats built by the firm with which he may be associated and naturally would be able to expound the advantages of this type, but if he attempted to discuss the advantages of other types his progress would naturally have to be somewhat along the lines of what a sailor would call "dead reckoning."

All this should be taken in account when criticising a paper on this subject and no doubt this will in a measure account for the author's apparent lack of information in regard to the "even keel" method of submergence.

Submerging Planes.

It is a well known fact that submarines both in this country and abroad have time and time again been submerged on the even keel principle by means of the submerging planes sometimes called "hydroplanes." These submerging planes are generally located near the center of the boat and when properly fitted so as to be free from hull influence may be made to exert a downward pull on the boat when she is underway, thus overcoming entirely or in part her reserve buoyancy when trimmed for submerging.

During even keel submergence the longitudinal axis of the boat has a tendency to move, more or less, out of the horizontal plane but is prevented by the action of the trimming rudders situated at the stern, or in some submarines, at both the bow and stern. These trimming rudders are constructed exactly as are the diving rudders in a diving submarine and while they both operate to incline the longitudinal axis of the boat the trimming rudders produce the contrary effect to the diving rudders; the latter purposely incline the longitudinal axis of the boat out of the horizontal plane in order that she may dive, while the former act to hold the longitudinal axis in the horizontal plane, and thus keep the boat on even keel.

Submarines constructed on the even keel principle have run submerged for long intervals of time maintaining constant depth and with practically no inclination of less than one degree. These results are what one would expect from a theoretical study of the forces acting during even keel submergence and they have been demonstrated in practice time and time again.

The Drop Keel.

In regard to the drop keel, the author's method proving that it is unnecessary for a single hull is very ingenious, but as very few, if any, submarines have ever been lost by collapse of the hull, due to descending beyond safe depths, its soundness is not so apparent.

It is easy to conceive that a submarine might be disabled in quite shallow water and suddenly sink to the bottom, in such a case the instantaneous release of a drop keel weighing several tons might be the means of bringing the boat to the surface and thus allowing the crew to escape.

The drop keel should, therefore, in the opinion of many commend itself for use on all submarines whether of the single or double hull type, especially as its presence leads to no real disadvantage.

Commander Hovgaard's Discussion.

Capt. W. Hovgaard: As regards Mr. Chace's remarks, that the submarines are built chiefly to attack battleships, I think in a general way that that is a correct view, but that function requires for its fulfilment two distinct types of boat, which I think are likely gradually to develop, in place of the present style of boat. It requires one type for harbor or coast defense, in the narrow sense, a boat which has a moderate radius of action, and not very great seagoing qualities, at least moderate sea going qualities, and that type we find already produced, practically in use, such boats as are produced by the Electric Boat Co. and also by the European boat builders.

The other type is really not yet in existence, but there is undoubtedly a tendency to produce such a type, a larger, more sea going type of boat, with greater speed. We all know that the great difficulty in realizing the construction of such a type is the motive power. We have at present no motive power which will lend itself satisfactorily to driving such a boat at a great radius of action, and with great sea going qualities and of high speed. The combustion engine has its limitations, and the steam engine, where it had been tried, seems not to have given full satisfaction, although it is still possible that steam in some form may ultimately be adopted, but it seems certain that there is an undoubted tendency to increase the displacement of these boats. By increasing the displacement we should always be able to gain in seaworthiness, and also, in a certain measure, we are able to increase the speed, and when we get further along this road of increasing the displacement, in order to obtain to a sea-going boat, it seemes likely that we shall arrive at some type intermediate between the single hull type in its pure form, and the double hull type. I mean thereby a boat which has the straight structure, as most boats have now, and light superstructure, giving the sea-going qualities and besides that, a lower structure, an under structure below the strength hull, can serve as water ballast tank, which need not be so strongly constructed as the hull proper, but I do not think it is likely that the double hull complete, if it is used now, is likely to be retained. I understood that it was used in the first boat constructed by M. Laubeuf of the French navy, in the first of the so-called submersibles. That boat, I understand, has a double hull all around, but proved very unsatisfactory, in that immersion was difficult to obtain, and the water tanks were long and difficult to fill completely, so that there was considerable difficulty with filling, it took a long time, and the trim was apt to be affected by the incomplete filling of these tanks between the two hulls.

(To Be Continued.)

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NOT A SUBSIDY.

The application of the word subsidy to the Ocean Mail Bill creates a false impression. It is in no sense of the word a subsidy, but is direct payment for definite service. It is simply payment for the carriage of the mails. The expression subsidy could just as well be applied to an expressman who is employed to carry one's trunk to the depot as it could be to vessels which are employed to carry our mails abroad. Both are engaged in transportation and both are entitled to compensation. It is a business transaction purely. To call it subsidy is erroneous, because subsidy in the public mind is associated with gratuity. Many persons hearing the shipping measure called a subsidy associate it with a general raid upon the public treasury and condemn it without further consideration. It would be well to eliminate the word subsidy altogether and to use only words which directly convey the meaning of the bill.

The Ocean Mail Bill is not a subsidy. The original Hanna-Payne bill was a direct subsidy measure, but the Ocean Mail Bill is a different proposition altogether. There can be no sound objection to it. Whatever objections have been advanced have been either academic or through a misunderstanding of its nature. Fundamentally the measure merits the support of everyone. Let the people once understand its real purpose and they will move as a phalanx to demand its passage. Its blessings are manifold, for it will not only promote industry and commerce, but stimulate national pride by strengthening our common defenses. It will benefit not a class but the whole people, not a section but the whole country. The measure is intended to further our mail facilities to points not now reached by American vessels, namely South America, the Philippines, Japan, China and Australasia. Vessels of the first class are not required for this service, but rather vessels that combine moderate speed with good carrying capacity.

The practice of every maritime country has been to assist its shipping through legislation. The nation that has been most consistent in this practice is Great Britain and the results are to be seen in every harbor of the world. It has achieved this end by liberal compensation for carrying the mails and admiralty subventions. She now does the world's carrying trade and has firmly established business connections in all quarters of the globe. This was done by steady, constant and never-ending protection to her shipping. Whatever may be said to the contrary, she has never for a minute permitted that protection to lag. It has been a business proposition with her simply —definite payment for definite service.

AN AFTERWORD.

The articles on the Naval Waste which have appeared in THE MARINE REVIEW during the past five months have attracted more widespread interest and discussion than any series that the REVIEW has ever published. They have been the topic of conversation in every ship yard, in every navy yard and in every circle throughout the United States where men congregate who understood the justice and force of the indictment. The articles were written with great directness and intelligence and with an assurance that was final and supreme because it was founded on fact. They were distinguished by a total absence of general statements. Herein, indeed, lay the author's great bulwark; his weapons were facts, a vast storehouse of them, incontrovertible, specific, precise, largely dug out of the department's own reports, nothing taken for granted, nothing presented on mere hearsay or rumor; but just simple, unbiased interpretation of existing conditions as revealed in the department's own records and by close first hand observation, and by that very circumstance constituting the most severe and pointed arraignment of the naval administration that has ever been drawn. The charges cannot be denied; not only that, but of the available evidence but a modicum has been adduced; it is not possible within the limitations of space to make the case complete even if all the facts could be uncovered.

There has been much speculation as to the identity of the author. Well, he is not of the corps of engineers, nor yet of the navy department but his technical training has been the equal of either and his practical experience greater than both. Costs have not been to him inconsequential trifles; he has had to make his business pay; he has had to distribute dividends among his stockholders. His passport is of undoubted authenticity. He has the right to speak. The wells of information which he has tapped have been available for years. In fact all that he has done has been to pass the bureau reports through a kind of mental prism, to hold them up to the lime light, and

reveal them in such manner that all may see the inefficiency and extravagance that exists as clearly as he sees it himself.

There has been no attempt at defense, which is not singular, because there is no defense. In fact the only attempt that the REVIEW has seen is the feeble objection made by the *Army and Navy Journal,* which seems more grieved at the reference to the Connecticut than anything else, though it is really a minor incident. The *Journal* accuses the REVIEW of taking credit to itself for the changes in navy yard administration and claims that they have been under consideration for years. Let the *Journal* rest its perturbed spirit in peace. The REVIEW has no desire to lay that flattering unction to its soul. It is perfectly willing to let it go at that. It has no desire to be held responsible even by suggestion for the latest "reorganization," a reorganization which, as far as we can discover, results in the creation of four new jobs and nothing else. The REVIEW has already editorially characterized this reorganization as a fake and the *Journal* can point to no expression of ours supporting it. If there is any credit attaching to it the *Journal* and its correspondents of "many years ago" are welcome to it. If, as the *Journal* says, this plan of reorganization "has engaged the attention of officials of the department for many years" it lends additional emphasis to our contention that inefficient methods and their pitiable results cannot be remedied by those who have grown up under the system itself. Quoting the old Union Pacific railroad as a horrible example is beside the question. The very fact that those methods were wiped out and that prosperity followed as a result is rather an argument in favor of similar heroic treatment of the Department.

Just a few words more about the Connecticut concerning which the *Journal* is so worried, and as we now observe with apparently good reason, since the *Journal* writer admits he "watched her construction every day for two years." The REVIEW apologizes for having unintentionally trodden on anyone's pet corn. We have endeavored to avoid personalities but we can readily understand that anyone so intimately associated with the the navy's chef d'oevre should rally to the defense.

Nevertheless the argument regarding laying off men and breaking in new ones rests on no sound basis and leads nowhere. The same thing applies to every ship yard. We say again it is not the truth, except perhaps to some extent as to unskilled or common labor, but not otherwise. Now one of the reasons advanced in support of building ships in navy yards (see departmental reports) is to hold together a force of men so that they are available for repair work. With this view we have no particular quarrel and if it were correct, the "discharge of thousands" could not occur, because if there is anything for which navy yards do not suffer it is repair work. Private plants have their seasons of plenty and of famine in a degree unknown in navy yards and the laying off and breaking in is always with them and yet when work comes the skilled men, whose breaking in would be a real question, are generally available, as every ship yard manager knows. They are not waiting at the gate but they are not far away and generally return. It is their trade and they stick to it and to the locality. Where has there been so much business in American yards as to absorb thousands of skilled workmen discharged after building the Connecticut when the object of building her was merely to retain them? As a matter of fact the New York navy yard entered into ship building on a purely competitive basis and so announced at the time the Connecticut was laid down, furnishing one more proof that the statements of the department are mere platitudes. The last chapter of the Naval Waste contained this charge: "That no ship building plant in this country, ever, at any time, produced such a beggarly output for the investment and equipment as in the case of the Connecticut."

When the *Journal* is prepared with figures to the contrary the REVIEW will be pleased to resume the discussion; until that time the arguments are still those of the layman.

LAKE ERIE-LAKE MICHIGAN CANAL.

Discussing the recent meeting at Ft. constructing a canal between Lake Erie and Lake Michigan, *Engineering News* asks "would there be any advantage to lake vessels in passing through such a channel instead of taking the present route through the open lake?"

The only likelihood of such a canal being constructed will come from its being considered too seriously. So far as lake vessels are concerned they are not asking for, nor even hoping for, anything of the kind. They couldn't afford to use it if it existed. Certainly the size and type of bulk freighter of the great lakes will not retrogress and a canal to accommodate ships of 15,000 to 18,000 tons displacement such as are now the standard is no fool ditch to be idly discussed by rustic boomers, even if the tonnage bound from Chicago for Lake Erie was not decreasing year by year. By far the larger tonnage out of Lake Michigan clears from the foot of the lake, not anywhere near Chicago, and even if there were no other advantages, the Straits and Lake Huron are the short course.

But the question of time is all important, since in this case we already have an available alternative route. The ordinary running time of the average freighter from Chicago, say, to Bar Point, Lake Erie, is about 65 hours—the package freighters, which constitute the larger proportion of the Chicago-Lake Erie tonnage, do it in ten to fifteen hours less. If the distance to be covered by the canal is taken at 225 miles, and the elevations are as the *Engineering News* states, 200 ft., requiring easily 25 lockages, the time required for one passage even without any delays due to passing vessels, waiting turn, etc., will not be less than ninety hours. The least time required for a lockage even in

the splendid locks at the Soo is about 40 minutes, of which but a small part is due to the filling or emptying of the lock chamber and is chiefly occupied in moving the ship in and out and making fast, opening and closing gates, etc. Twenty-five lockages even at 40 minutes each is 16.6 hours. Such a canal as this would necessarily be, without any large bodies of water available as a part of the channel, cannot be navigated by a loaded ship at over 3 miles per hour, or 75 hours without any interruptions of any sort; a total of 91.6 hours. As a matter of fact, no man who knows anything of canaling with a loaded ship would expect to do even so well. The number of lockages is, however, beyond question very much underestimated. Since the terminal levels are practically identical, an elevation of 200 ft. certainly means 400 ft. of lock lift, and an average lift of 16 ft. would be most improbable, if not impossible.

The canal advocate will, of course, claim that the figures as to speeds and time are unfair; no canal advocate was ever known to use anything less than five miles per hour in his estimate, and just as certainly no loaded ship was ever known to make it. The objections which exist to a sea level canal at Panama and set forth in THE MARINE REVIEW for April, 1909, apply also in this case. And in addition, a condition has to be considered which will not exist at Panama, and that is the navigating of the ship in light trim, a common and inseparable incident of lake business. To take a ship "flying light" through such a ditch in anything more than a light breeze is a physical impossibility. And above all, let it be clearly understood that lake shipping is not asking for it and would not use it if it were built, and the only people who are pushing it are those who have land to sell or are in some way interested in its construction.

The six-masted schooner, now building at the Percy & Small yard, Bath, Me., will be the largest vessel of her type ever built and will be the largest wooden sailing vessel in the world.

ORE SHIPMENTS.

Ore shipments during December were 519,525 tons, making the total movement for the season of 1909 41,683,873 tons, an increase of 395,118 tons over the record of 1907 when 41,288,755 tons were moved. Following are the figures for December and for the entire season with corresponding data for the two preceding years:

Port.	Dec., 1907.	Dec., 1908.	Dec., 1909.
Escanaba	39,572	19,272	115,571
Marquette	4,466	19,305	32,367
Ashland	14,396	14,707	97,551
Superior	13,204	25,640	34,978
Duluth	.....	.....	174,177
Two Harbors	19,179	.....	64,981
	90,817	78,924	519,525

Port.	Season 1907.	Season 1908.	Season 1909.
Escanaba	5,761,988	3,351,502	5,747,991
Marquette	3,013,826	1,487,487	2,909,453
Ashland	3,437,672	2,513,670	3,834,285
Superior	7,440,386	3,564,030	6,540,505
Duluth	13,445,977	8,808,168	13,470,503
Two Harbors	8,188,906	5,702,237	9,181,131
	41,288,755	25,427,094	41,683,873

ORE ON DOCK DEC. 1.

The figures compiled by THE MARINE REVIEW from the returns sent in by the various dock companies show that iron ore receipts at the Lake Erie ports during the season of 1909 were 33,672,825 tons, out of a total movement of ore by lake of 41,683,873 tons. Lake Erie docks on Dec. 1 held a balance of 8,965,789 tons, which is the largest store on hand in the history of the traffic, the previous high figure being in 1908, when 8,441,533 tons were on hand.

During 1908, the total shipment by lake was 25,427,094 tons, of which Lake Erie docks received 20,414,491 tons and held a balance on Dec. 1, 1908, of 8,441,533 tons. During 1907 the total shipment by lake was 41,288,755 tons, of which Lake Erie docks received 35,195,758 tons and held a balance on Dec. 1, 1907, of 7,385,728 tons. During 1906 the total shipment by lake was 37,513,595 tons, of which Lake Erie docks received 32,076,757 tons and held a balance on Dec. 1, 1906, of 6,252,455 tons. The reserve of 8,965,789 on Lake Erie docks Dec. 1 is ample for winter consumption. Never in the history of the trade have 5,000,000 tons gone forward from dock to furnace during the winter season.

Shipments to furnaces between May 1, and Dec. 1, 1909, aggregate 30,077,304 tons, compared with 17,453,258 tons in 1908, 29,787,018 tons in 1907, 27,615,392 tons in 1906, 24,311,720 tons in 1905, 16,658,806 tons in 1904, 16,903,013 tons in 1903, 18,423,364 tons in 1902 and with 14,204,596 tons in 1901.

The shipments to furnaces during the season of navigation as referred to are determined in this way: First we have the amount of ore on Lake Erie docks before the opening of navigation, May 1 last, 5,370,268 tons; add to this the receipts of the season just closed, 33,672,825 tons, and the total is 39,043,093 tons; deduct the amount on dock Dec. 1, 8,965,789 tons, and we have 30,077,304 tons as the amount that was forwarded either direct or from dock to furnace yards. It is, of course, understood that the difference between the total output of 41,683,873 tons which was shipped from the Lake Superior mines during 1909, and the receipts of 33,672,825 tons at Lake Erie ports, is ore that went to places other than Lake Erie ports, such as the furnaces at Lake Michigan ports. The accompanying table shows receipts at Lake Erie ports and amounts on dock during six years past.

IRON ORE RECEIPTS AT LAKE ERIE PORTS GROSS TONS.

	1909	1908	1907	1906	1905	1904
Toledo	1,374,224	680,553	1,314,140	1,423,741	1,006,855	508,792
Sandusky	11,088	.....	83,043	35,847	51,202	48,356
Huron	243,082	213,377	971,430	778,453	825,278	231,364
Lorain	2,796,856	2,286,388	2,621,025	2,191,965	1,605,823	972,931
Cleveland	6,051,342	4,240,816	6,495,998	6,604,661	5,854,745	3,572,228
Fairport	1,734,277	1,518,961	2,437,649	1,861,498	2,008,621	1,157,858
Ashtabula	8,056,941	3,012,064	7,521,859	6,833,352	6,373,779	3,639,250
Conneaut	7,007,834	4,798,631	5,875,937	5,432,370	5,327,552	4,083,655
Erie	1,235,057	828,602	2,294,239	1,986,539	2,112,476	1,284,778
Buffalo	5,002,235	2,835,099	5,580,438	4,928,331	3,774,928	2,433,601
Detroit	159,889	.....	.....	.....	.....	.....
Total	33,672,825	20,414,491	35,195,758	32,076,757	28,941,259	17,932,814

IRON ORE ON LAKE ERIE DOCKS, DEC. 1, GROSS TONS.

	1909	1908	1907	1906	1905	1904
Toledo	332,456	590,925	518,645	281,000	368,024	318,573
Sandusky	39,557	36,079	44,546	17,467	52,977	75,134
Huron	477,333	458,158	415,730	245,499	208,023	182,495
Lorain	407,129	426,274	366,271	336,321	271,695	299,504
Cleveland	1,547,142	1,458,392	1,281,335	1,224,606	1,330,619	1,237,033
Fairport	867,640	835,821	523,981	590,783	759,961	660,420
Ashtabula	2,594,359	2,293,531	2,056,820	1,631,312	1,589,951	1,403,575
Conneaut	1,411,002	1,296,675	1,090,774	1,057,424	976,976	684,487
Erie	788,046	730,530	652,219	552,631	564,961	583,439
Buffalo	501,125	315,148	435,407	315,412	315,780	318,739
Total	8,965,789	8,441,533	7,385,728	6,252,455	6,438,967	5,763,399

AVERAGE LAKE FREIGHT RATE.

There is appended herewith the usual annual summary of lake freight rates for the season of 1909. It presents but slight change from 1908, which was the poorest of many years, but had the advantage of keeping the vessels busier. The soft coal rate to Lake Michigan ports was shaved 5 cents at the beginning of the year, and the lumber rate to the head of the lake works out at a little less figure, but the average ore and grain rates are a trifle better than in 1908. The opening rate on grain from the head of the lakes was 1¾ cents, and from Chicago 1⅜ cents. A general advance in the ore rate of 10 cents is predicted for 1910. Following is the summary:

AVERAGE FREIGHT RATE ON IRON ORE PER GROSS TON FROM PORTS NAMED TO OHIO PORTS - TABLE COVERING WILD AND CONTRACT RATES FOR 20 YEARS PAST.

	Escanaba.		Marquette.		Ashland and other ports at the head of Lake Superior.	
	Wild or daily rate.	Contract rate.	Wild or daily rate.	Contract rate.	Wild or daily rate.	Contract rate.
1890	..0.89	1.10	1.07	1.25	1.17	1.35
1891	..0.84	0.65	1.02	0.90	1.11	1.00
1892	..0.74	1.00	0.98	1.15	1.15	1.25
1893	..0.56	0.85	0.71	1.00	0.77	1.00
1894	..0.46	0.60	0.60	0.80	0.78	0.80
1895	..0.73	0.55	0.92	0.75	1.13	0.80
1896	..0.52	0.70	0.66	0.95	0.77	1.05
1897	..0.45	0.45	0.55	0.65	0.57	0.70
1898	..0.51	0.45	0.60	0.60	0.62	0.60
1899	..0.95	0.50	1.08	0.60	1.29½	0.60
1900	..0.69¼	1.00	0.78½	1.10	0.84½	1.25
1901	..0.64	0.60	0.79	0.70	0.89	0.80
1902	..0.59	0.60	0.66	0.70	0.77	0.75
1903	..0.61	0.65	0.72	0.75	0.81	0.85
1904	..0.53½	0.55	0.62	0.60	0.70	0.70
1905	..0.61	0.60	0.70	0.70	0.77	0.75
1906	..0.60	0.60	0.70	0.70	0.7555	0.75
1907	..0.60	0.60	0.70	0.70	0.75	0.75
1908	..0.50	0.50	0.60	0.60	0.65	0.65
1909	..0.52	0.50	0.61	0.60	0.66	0.65

AVERGE DAILY RATES OF FREIGHT ON THE GREAT LAKES.

	1907. Cents.	1908. Cents.	1909. Cents.
Iron ore, Escanaba to Ohio ports, gross ton	60.00	50.00	51.73
Iron ore, head of Lake Superior to Ohio ports, gross ton	75.00	65.00	66.41
Iron ore, Marquette to Ohio ports, gross ton	70.00	60.00	61.41
Wheat, Chicago to Buffalo, bu	1.5796	1.00	1.5641
Wheat, Duluth to Buffalo, bu	1.8639	1.2299	1.9587
Soft coal, Ohio ports to Milwaukee, net ton	49.00	40.00	36.75
Soft coal, Ohio ports to Duluth, net ton	30.00	30.00	31.30
Soft coal, Ohio ports to Portage, net ton	50.00	30.00	31.25
Soft coal, Ohio ports to Manitowoc, net ton	35.00	35.00	31.25
Soft coal, Ohio ports to Sheboygan, net ton	35.00	35.00	31.25
Soft coal, Ohio ports to Green Bay, net ton	35.00	35.00	32.35
Soft coal, Ohio ports to Escanaba, net ton	35.00	35.00	31.25
Hard coal, Buffalo to Milwaukee, net ton	41.062	40.00	41.80
Hard coal, Buffalo to Chicago, net ton	40.777	40.00	41.99
Hard coal, Buffalo to Duluth, net ton	31.256	30.00	31.98
Lumber, head of the lakes to Ohio ports	258.549	261.08	240.08

AVERAGE DAILY FREIGHT RATES 10 YEARS, ENDING WITH 1909.

	Cents.
Iron ore, head of Lake Superior to Ohio ports, gross ton	76
Iron ore, Marquette to Ohio ports, gross ton	69
Iron ore, Escanaba to Ohio ports, gross ton	59
Soft coal, Ohio ports to Milwaukee, net ton	45
Soft coal, Ohio ports to Duluth, net ton	35
Hard coal, Buffalo to Chicago, net ton	44
Hard coal, Buffalo to Duluth, net ton	34
Wheat, Chicago to Buffalo, bu	1.50
Wheat, Duluth to Buffalo, bu	1.91
Lumber, head of the lakes to Ohio ports	254.00

AVERAGE OF DAILY LAKE FREIGHT RATES ON HARD COAL FROM BUFFALO TO CHICAGO, MILWAUKEE AND DULUTH DURING TEN YEARS PAST.

Year.	Chicago. Cents.	Duluth. Cents.
1900	48	39½
1901	50	38
1902	42	33
1903	48	38
1904	43	34
1905	44	34
1906	46	35
1907	40	31
1908	40	30
1909	41	32
Average for 10 years	44	34

Rate to Milwaukee practically the same as to Chicago.

Hard coal is net tons and is handled without charge to vessel.

AVERAGE OF DAILY RATES ON SOFT COAL FROM OHIO PORTS TO MILWAUKEE, ESCANABA, DULUTH, GREEN BAY AND MANITOWOC.

Year.	Milwaukee. Cents.	Escanaba. Cents.	Duluth. Cents.	Green Bay. Cents.	Manitowoc. Cents.
1900	45	40	40	45	43½
1901	49	46	38	48½	48
1902	46½	41½	34½	46½	42
1903	50½	45	41½	50½	46
1904	47	40	37	45½	47
1905	46½	41½	33½	42	41½
1906	46	42	35	42	42
1907	40	35	30	35	35
1908	40	35	30	35	35
1909	37	31	31	32	31
Average for 10 years	45	40	35	42	41

Chicago rate about same as Milwaukee.

Coal of all kinds shipped in net tons and handled without charge to vessel.

Charge to vessels in 1909 for unloading iron ore was 20 cents per ton. The wooden vessels that required trimming paid an additional charge of about 3 cents per ton for that service.

Average ore rates for the entire period of 20 years: Escanaba, contract 65 cents, wild 62½ cents; Marquette, contract 79 cents, wi'd 75 cents; Ashland and other ports at the head of Lake Superior, contract 85 cents, wild 85 cents.

Average for past 10 years: Escanaba, contract 62 cents, wild 59 cents; Marquette, contract 71¼ cents, wild 69 cents; Ashland and other ports at the head of Lake Superior, contract 79 cents, wild 76 cents.

LAKE FREIGHT RATES ON WHEAT, DULUTH TO BUFFALO.

Year.	Rate. Cents.	Year.	Rate. Cents.
1909	1.96		
1908	1.22		
1907	1.86		
1906	2.19		
1905	2.31	1894	1¼@3
1904	1.81	1893	1¼@3½
1903	1.6	1892	2½@4
1902	1.9	1891	1¾@9½
1901	2.3	1890	2 @5
1900	2.0	1889	2 @5
1899	3.6	1888	2 @5
1898	1.8	1887	2 @8
1897	1.75	1886	3½@8
1896	2.12		
1895	3.50		

Figures for 15 years past average of daily rates for full season; previous to 1895 rates given are highest and lowest of the year.

AVERAGE RATES ON WHEAT PER BUSHEL BY LAKE FROM CHICAGO TO BUFFALO.

Year.	Cents.	Year.	Cents.	Year.	Cents.
1860	9.89	1877	3.72	1894	1.27
1861	11.53	1878	3.07	1895	1.97
1862	10.49	1879	4.74	1896	1.70
1863	7.51	1880	5.75	1897	1.56
1864	9.58	1881	3.44	1898	1.53
1865	9.78	1882	2.50	1899	2.71
1866	12.34	1883	3.41	1900	1.79
1867	6.67	1884	2.18	1901	1.42
1868	7.14	1885	2.02	1902	1.51
1869	6.81	1886	3.68	1903	1.41
1870	5.88	1887	4.13	1904	1.32
1871	7.62	1888	2.56	1905	1.67
1872	11.46	1889	2.51	1906	1.72
1873	7.02	1890	1.96	1907	1.57
1874	4.03	1891	2.38	1908	1.00
1875	3.42	1892	2.38	1909	1.56
1876	2.90	1893	1.66		

Average for 50 years, 4.25.

Charges to vessels for shoveling, trimming and tallying weights of grain amounted to $4.12½ per 1,000 bu. in 1909.

AVERAGE LUMBER RATES, DULUTH TO LAKE ERIE PORTS.

Year.	Rate per M.	Year.	Rate per M.
1909	$2.40	1903	$2.57
1908	2.61	1902	2.54
1907	2.58	1901	2.66
1906	2.71	1900	2.33
1905	2.45	1899	3.08
1904	2.54		

LAKE MICHIGAN ORE RECEIPTS.

The growing importance of Lake Michigan's Lake Superior ore receiving ports is proved by the receipts of 1909 when 6,929,831 tons were received. A few years ago the ore receipts at Lake Michigan ports were insignificant, but during the past three years the development of steel plants along the southern shore of Lake Michigan has been rapid. Following are the receipts by ports:

South Chicago, Ill	4,673,810
Milwaukee, Wis.	178,720
Gary, Ind.	1,921,818
East Jordan, Mich	18,623
Boyne City, Mich	37,062
Elk Rapids, Mich	46,037
Fruitport, Mich.	53,761
Total	6,929,831

It is announced from Buffalo that Congressman Alexander will ask for an appropriation for the survey of a fourth lock on the American side at Sault Ste. Marie. Work is now under way on a third lock to be approximately 1,350 ft. long, but it is believed that by the time it is finished a fourth lock will be urgent. In fact, this has been the history of the locks at the Sault; the Poe lock was no sooner finished than it proved inadequate. For while it was designed forever to lock through four vessels at a time, yet, before it was completed it was seen that it could lock through only two and now it can lock through only one of the larger type of carrier at a time.

There is a marked demand for coal in the northwest and shipments from docks to the interior are heavy, notwithstanding the weather. It is predicted that the docks will be practically clean when navigation opens, and that the coal movement next year will be correspondingly heavy.

COMMERCE OF SAULT STE. MARIE CANALS.

The statement of lake commerce through the canals at Sault Ste. Marie for the season of 1909 has just been issued by Col. C. McD. Townsend. The total commerce for 1909 was 57,895,149 net tons as against 41,309,557 tons for 1908, an increase of 40 per cent. The 1909 movement comes within 322,065 tons of equaling the 1907 movement when 58,217,214 tons were moved. During December 1,791,-

349 tons were moved through the canals.

The United States canal was opened April 20 and closed Dec. 11, a season of 236 days. The Canadian canal was opened April 21 and closed Dec. 16, a season of 240 days.

Herewith is the comparative statement for the years 1908 and 1909.

COMPARATIVE STATEMENT OF SAULT STE. MARIE CANAL COMMERCE.

ITEMS	Total Traffic Season 1908	Season 1909	Increase Amount	Per cent
Vessels:				
Steamers, number	12,553	16,463	3,910	31
Sailing, number	1,355	1,787	432	32
Unregistered, number	1,273	954	319	25
Total, number	15,181	19,204	4,023	26
Lockages, number	10,685	13,571	2,886	27
Tonnage:				
Registered, net	31,091,730	46,751,717	15,659,987	50
Freight, net	41,390,557	57,895,149	16,504,592	40
Passengers, number	53,287	59,948	6,661	13
Coal:				
Hard, net tons	1,384,743	1,412,387	27,644	2
Soft, net tons	8,517,717	8,527,639	9,922	..
Flour, barrels	5,704,375	7,094,175	1,389,800	24
Wheat, bushels	106,041,873	113,253,561	7,211,688	7
Grain, bushels	43,458,583	46,519,451	3,060,868	7
Manufactured and pig iron net tons	289,308	522,281	232,973	81
Salt, barrels	547,223	651,091	103,868	19
Copper, net tons	101,735	127,212	25,477	25
Iron Ore, net tons	24,650,340	40,014,978	15,364,638	62
Lumber, M. ft. B. M.	453,761	552,380	98,619	22
Building Stone, net tons	1,019	1,784	765	75
General merchandise, net tons	842,901	1,140,344	297,443	35

GRAIN ELEVATOR INDUSTRY.

Buffalo, Jan. 5.—The radical change taking place in the grain elevator industry is well illustrated by the announcement that the Spencer Kellogg Co. was preparing to tear down its Coatsworth elevator and erect a steel one in its place. The Coatsworth is a good house for handling grain and is by no means old or antiquated, as it replaced the older house of the same name, which burned 15 years ago or so. All the trouble with it is that it is of wood and that alone classes it far below the fire-proof elevator. The Western Elevating Association lately issued their winter-storage rate card and as usual made a rate of 2 cents on the fireproof houses and one of 1½ cent on the other, which tells the story plain enough.

The new Coatsworth elevator will have a capacity of 1,000,000 bushels to 750,000 of the present house and it is to be erected on a new plan that will provide machinery to take the place of about half the working force of even most of the later fire-proof structures of that sort. It will be 56 by 285 ft. in dimensions and 155 ft. high, costing about $275,000. It is stated that the removal of the present elevator will begin about the first of the year, so that the new one ought to be ready by fall.

The elevator industry has had a great many turns up and down in Buffalo harbor during the last quarter of a century. Not so very long ago it was given the polite name of the "Pirate Monopoly," a term used with many variations by the many enemies of this grain route and some of the more wordy of the canal boatmen. There was of course a shadow of truth to the charges, as there usually is in such cases, but at the same time it is doubtful if the charge of ⅞ cent in the old days before the state law began the cutting of it down to ½ cent ever drove any considerable amount of business away from this route. Certainly the route was never so much in danger from outside competition then as it is today.

Of late everything has seemed to work against the Buffalo-New York grain route. There has been much said about Canadian competition via Montreal and that has done what it could, but after all that can be said the real competitor has been the all-rail route through from the grain centers of the west, which enables the shipper to maintain his small elevator and sell to eastern customers without putting his grain through the elevators of either Chicago or Buffalo. Then the railroads have beaten the lake-and-rail route again by a high rate from Buffalo to the seaboard, which both Buffalo and New York have tried in vain to reduce.

Though this city is in a hurry for the completion of the barge canal to tide water mainly for the outlet it will afford to her fast-growing iron industry it can hardly fail to reduce competition in grain carrying to its lowest terms, for it will then be possible to carry freight to the seaboard so much cheaper than it can be carried now that it may again pay to hold corn for putting through the Chicago elevators for lake and canal shipment, just as used to be the practice long ago. It does not take a very old member of the grain trade to remember when the lake interests began to notice that grain from points not north of Chicago began to come east by rail without regard to the lake opening, but as it goes now there will never again be any 10,000,000-bushel opening fleet from Lake Michigan to Buffalo, though the lay of the land still places the lakes first on grain from the Northwest, so that there is little rail competition yet from Duluth.

People who go to Europe do not fail to express admiration for the way some features of the railroad service are carried out, but at the same time they find the river Rhine crowded full of freighting tows and note that England, so small and narrow that any route is pretty short, still keeping up its little one-horse canals everywhere, all in spite of what the railroads are able to do by way of competition. America came pretty near making a bad mistake in the giving up of its canals and neglecting certain features of its lake routes, but that day is no doubt past. The Erie barge canal is being rushed ahead at the rate of over a million dollars a month and if it proves half the benefit that its friends believe it will there will be no further throwing away of canals in this country.

Buffalo has now 19 elevators that have done a lake business this season, of which 10 are in the pool direct and five of the others are barred out by being owned by railroads, but which prorate with the pool and the others are making no particular disturbance, so that the business is quite tranquil, though it is not at the best very profitable in these days, for the amount of grain is less than it used to be and expenses go up as rates go down. The late increase of winter storage business has done something towards making the business profitable. The half-cent rate charged by vessels for holding grain through the winter divides this business with the elevators, as they carry several million bushels.

There are now six fire-proof elevators in operation in the harbor and there will soon be added the elevator of the Washburn-Crosby mill, of 1,000,000 bushels capacity, the new Wheeler of 750,000 bushels, which with the new Kellogg will provide a safe storage capacity of about 12,500,000 bushels.

JOHN W. CHAMBERLIN.

Notable Rescues on Lake Vessels

THE early days of December, 1909, were notable in lake navigation not only for the severe and unusual storms which swept the lakes and the loss of life on Lake Erie but for two feats of seamanship brilliant even among the many which mark the handling of big lake steamers and so perfect in their finish and workmanship as to be worthy of the commendation and admiration which will be fully conceded by sailors everywhere. The perfect control of his ship and his sublime and unconscious confidence in himself and his fellow masters, in intricate situations which characterize the lake master, perpetually amaze the deep-sea sailor accustomed to ample sea room and comfortable channels. It is no disparagement to say that even the most skillful average coast master would absolutely refuse to undertake some of the things which are matters of every day to the lake skipper. It is merely that he has not grown up amidst the conditions peculiar to the lakes where maneuvering big ships in narrow channels and crowded harbors loaded and light, with many times but a few inches of water between him and a big job for the dry dock or the wreckers, is an every day occurrence, and has resulted in a skill which is unequalled in the world.

Among the dangerous spots negotiated in all weathers and not always without anxieties is the Pelee Passage, marked at the easterly end by Southeast Shoal lightvessel, as shown on the section of chart reproduced herewith, Fig. 1.

On the evening of Dec. 8, the Anchor line steamer Clarion, a package

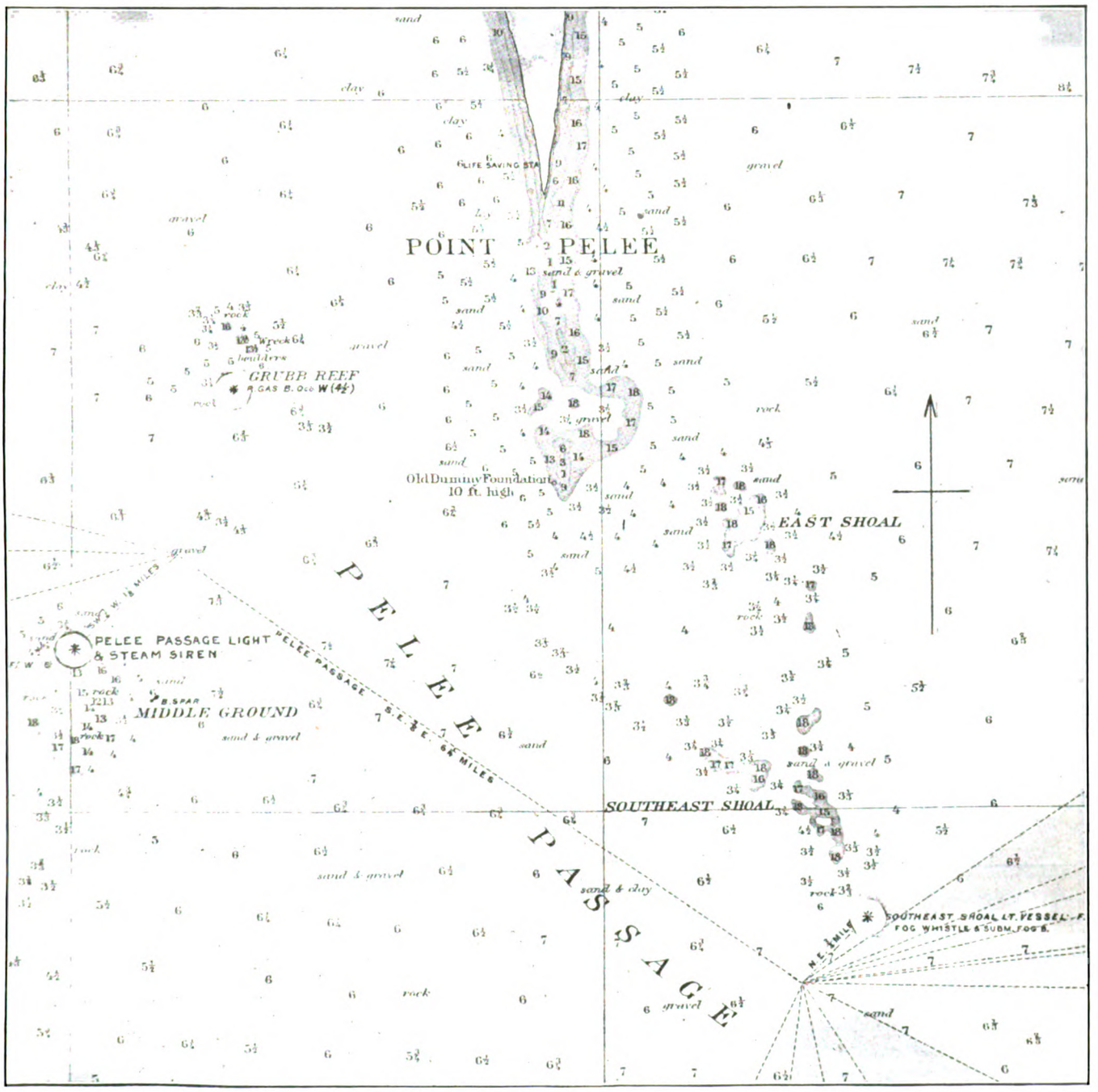


FIG. 1—SECTION OF CHART OF LAKE ERIE SHOWING VICINITY OF PT. PELEE.

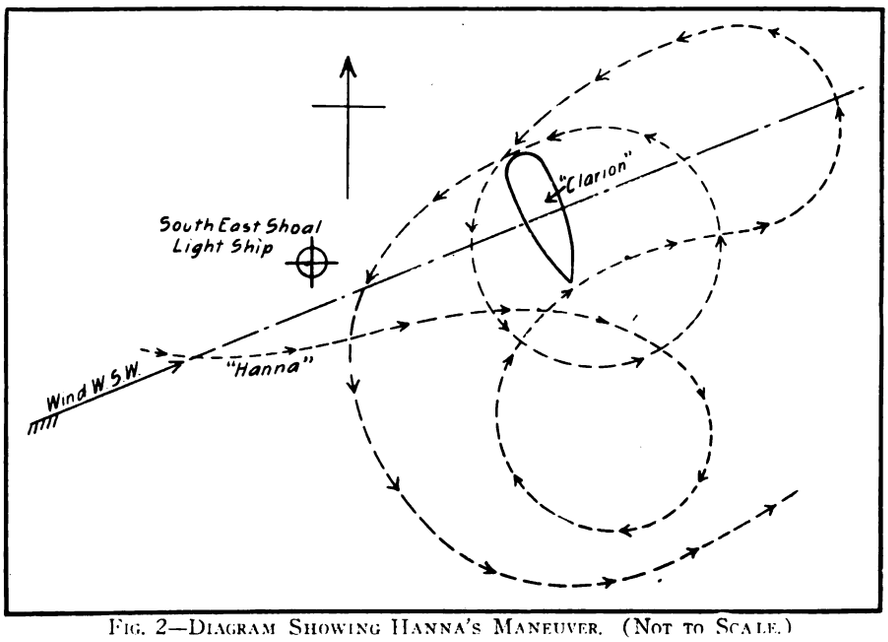


FIG. 2—DIAGRAM SHOWING HANNA'S MANEUVER. (NOT TO SCALE.)

freighter of the older type, bound eastward, loaded, took fire to the westward of the light ship and it was found impossible to get the fire under control. The wind was about W. S. W. and blowing a gale and the weather intensely cold. Twelve of her crew got away in one of the boats and have never since been heard of. The remaining six attempted the second boat, which was stove and lost. The blazing hull drifted broadside to leeward, passing the lightvessel close aboard, the crew of the latter utterly helpless to offer assistance, their own vessel coated heavily with ice and demanding all their attention and the crew of three unable to get a boat over even if their duties would have permitted their leaving their own vessel. About 8:30 p. m., the Clarion having drifted about a mile to the eastward of the lightvessel, the freighter L. C. Hanna, downbound with ore, passed the lightvessel and shortly sighted the Clarion in the dense fog. As the diagram (Fig. 2) and chart show, the Hanna's course carried her to the southward of the Clarion and Capt. Anderson put his wheel hard-a port and came to windward again, running in to get a closer look, then, making out men aboard, ran to leeward to get room, starboarded and, coming round, passed under the Clarion's stern, just brushing her and nothing more, so that five of the six men jumped and landed on the Hanna's deck. The sixth man, benumbed with cold and advanced in years, was unable to make the leap in the precarious footing on an ice covered ship, rolling deep, broadside to a raging sea, and as the Hanna passed on, threw up his hands in despair. Capt. Anderson resolved to make one more effort and, realizing that time was short, drove his ship in the shortest possible circle and again came under the Clarion's stern, passing within a foot and rescued the last man.

After clearing the Clarion, Capt. Anderson, having learned of the getting away of the boat with the 12 men, ran in towards the lightvessel to learn if they might have reached her, but the crew of the lightvessel had seen nothing of them, and the Hanna was put upon her course.

To the sailor who can understand what this really means it is unnecessary to add anything. To take a big ship, with a displacement of nearly 13,000 tons, greater than that of many ocean liners, with the low, almost inadequate, power of the slow moving bulk freighter, and maneuver her in a howling gale and boiling sea to close with a drifting, tossing, burning hulk and with such nicety of touch and calm judgment, taking the

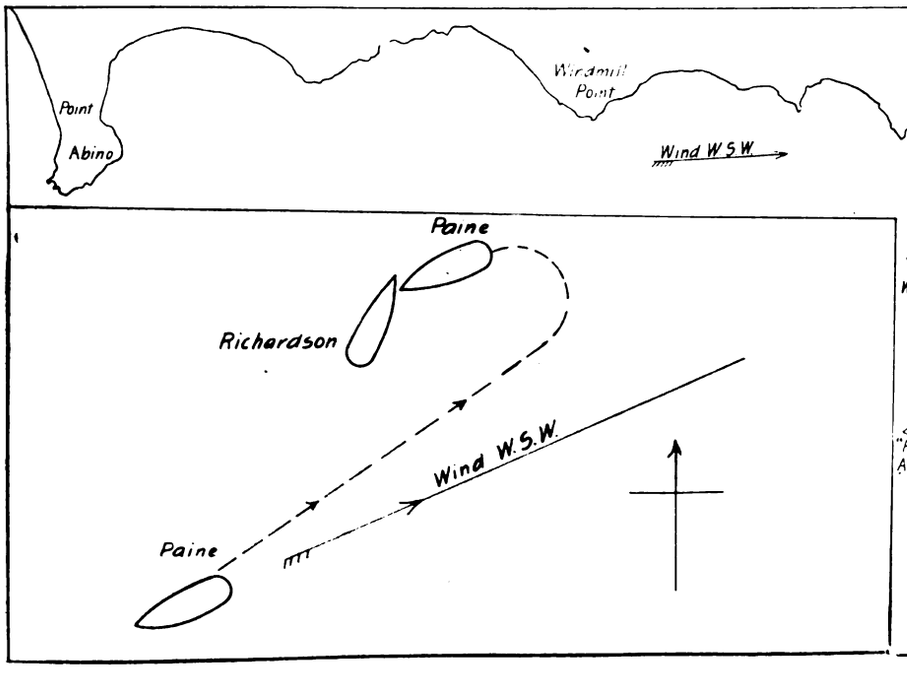


FIG. 4—PAINE'S MANEUVER. (NOT TO SCALE.)

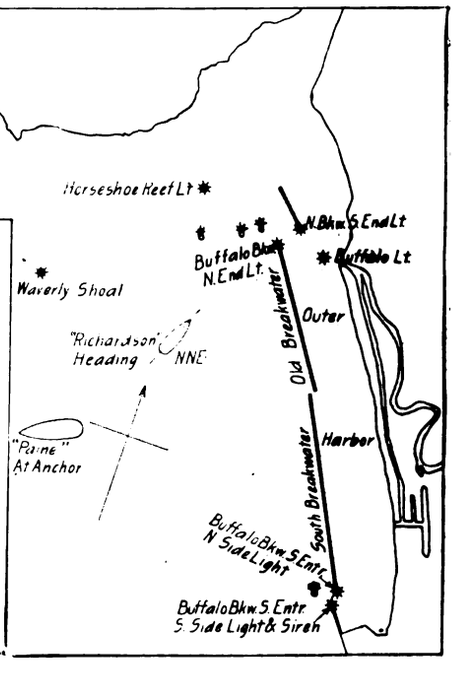
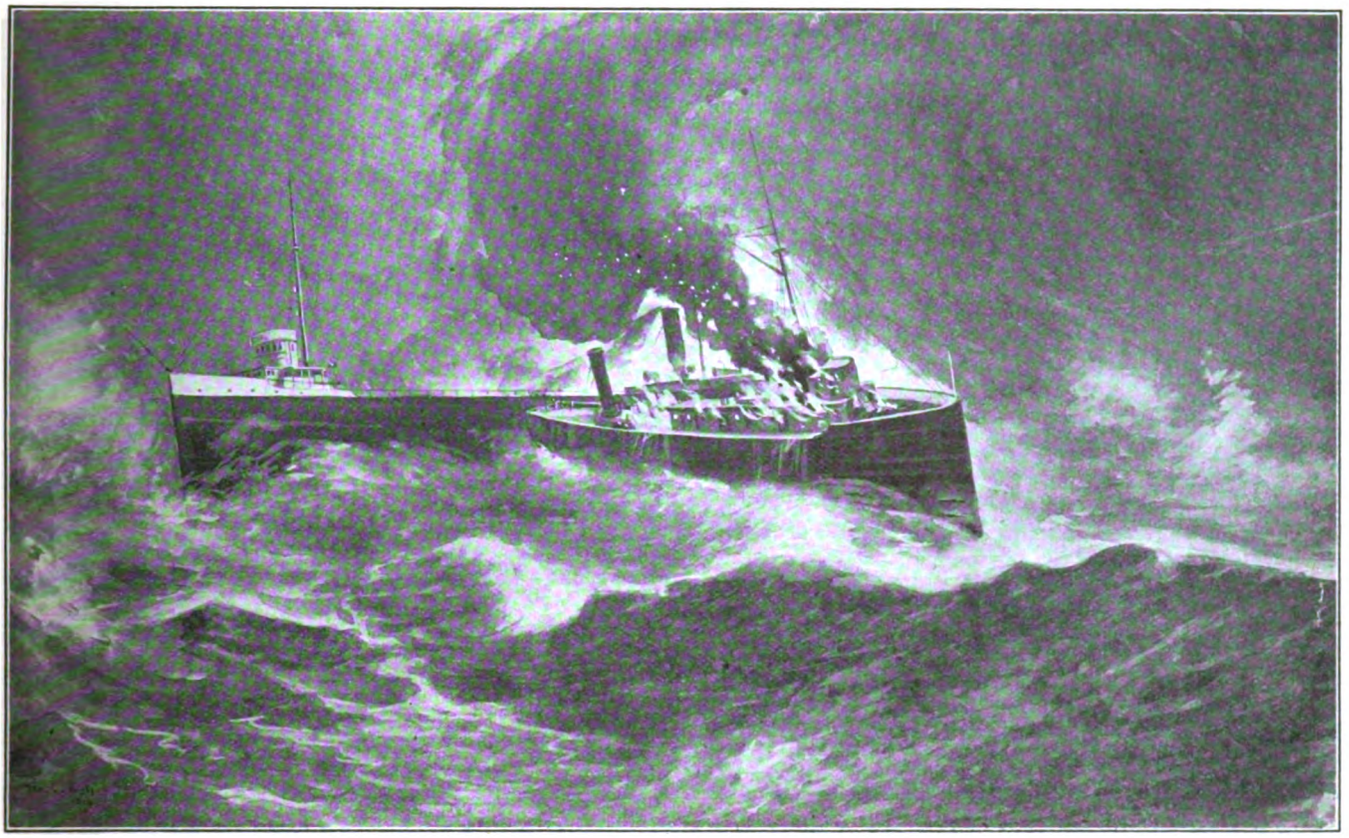


FIG. 3—SECTION OF CHART SHOWING SECTION OF EASTERLY END OF LAKE ERIE. SHIPS' POSITIONS APPROXIMATE.

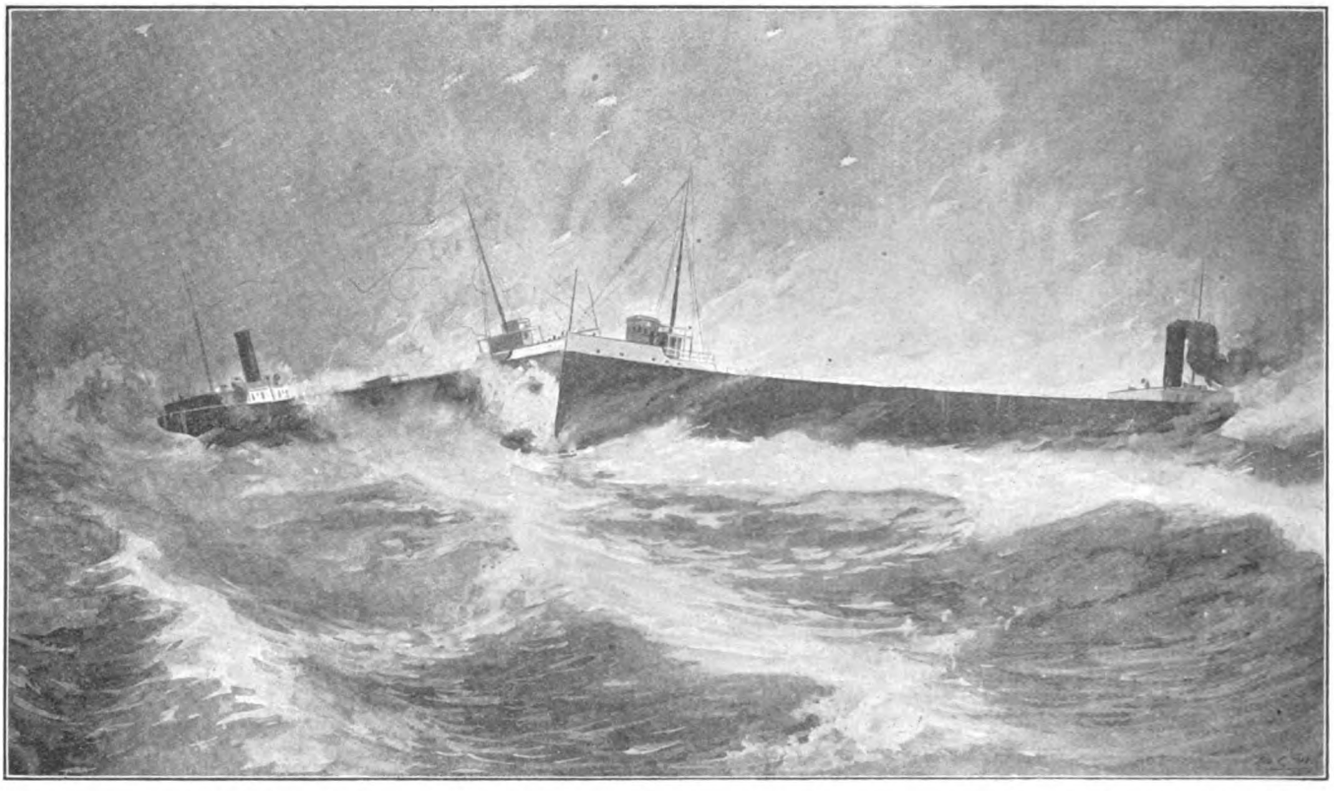


THE STEAMER L. C. HANNA TAKING OFF THE CREW OF THE BURNING STEAMER CLARION NEAR SOUTH-EAST SHOAL ON THE NIGHT OF DEC. 8.

risk of collision and of fire, marks the absolutely finished workman.

The steamer Josiah C. Munro, bound up, loaded, was about 3 miles westward of the lightship when the flames broke out through the Clarion's decks, and Capt. Sayre, on sighting the fire, immediately put about and headed for it. The Clarion was at that time drifting over the shoals to the north of the lightship, but the lights of the latter were not visible in the dense vapor hanging low over the water, and it appears that the crew of the lightship sighted the fire about the same time and commenced to blow alarm signals, thus indicating to Capt. Sayre her position, and the latter, finding himself close to the shoals, put his wheel aport, intending to go around the lightvessel, but unfortunately stranded in 17½ ft., chiefly on account of the low water caused by the westerly gale, and was thus robbed of the opportunity of giving assistance. As this was nearly half an hour before the Hanna reached the scene, it is certain that had Capt. Sayre a few moments' earlier indication of the position of the lightship, he would have been able to rescue all hands. Capt. Sayre deserves full credit for his efforts; he did all that could be done, and as the result shows, imperilled his own ship and crew in the attempt. Capt. Sayre says the night was one of the wildest he has ever seen and the dense vapor coming off the water shut out everything but masthead lights, and those of the lightship being relatively low and invisible, her whistle should have been kept going.

The following day, Dec. 9, witnessed another rescue under different circumstances but calling for not less skillful work. The steamer W. A. Paine, 500 ft. long, 52 ft. beam, loaded with 9,530 tons of flaxseed, had, during the entire day of Dec. 8, been running down Lake Erie, bound for Buffalo, before the W. S. W. gale, and as every seaman will realize, with consequent severe duty to the steering gear. By the time the lower end of the lake was reached the gear had become so slack that Capt. Detlefs decided not to attempt to enter Buffalo until the gear had been overhauled and came to anchor as shown in the diagram Fig. 3, with both anchors down. During the night of Dec. 8, the steamer W. C. Richardson, also bound for Buffalo with 6,200 tons of flaxseed, attempted to round to off Pt. Abino, 14 miles from Buffalo, to await the blowing out of the gale and in doing so shifted her cargo and the seas breaking over her filled her engine and boiler rooms and left her helpless. In this condition she drifted down the lake, settling by the stern, and grounded aft in about 30 ft. of water about a mile off the breakwater, and perhaps one and a half miles to leeward of the Paine at anchor, with the seas breaking all over her and her crew crowded in the quarters forward. Capt. Detlefs of the Paine resolved to make an effort at rescue but there was imminent danger to his own ship and crew in an effort to go to leeward of the Richardson on account of the heavy seas and the currents setting towards the head of Niagara river, and the proximity of the breakwall. Capt. Detlefs therefore hove up one anchor and allowed his ship to drift until she was somewhat to leeward of the Richardson, as indicated by Fig. 4, then giving both anchors 50 fathoms of chain he drove his engines at full speed ahead, dragging both anchors and heading for the Richardson's bow, over which, when he had approached within a few feet, he threw a ladder and took all hands off though it was necessary to put heaving lines on some of the crew and pull them aboard. By this maneuver he retained full control of his own ship at every instant and heading always to windward, whereas had he attempted to bring her round with the wheel only he would almost certainly have wrecked his own ship also. It was a beautiful piece of work, well planned and brilliantly executed under condi-



THE STEAMER W. A. PAINE RESCUING THE CREW OF THE STEAMER W. C. RICHARDSON OFF BUFFALO HARBOR ON DEC. 9.

tions of weather and locality as bad as they well could be and that the Paine came out with no more than a slightly twisted stem caused by the ships rolling together is remarkable. In the case of the Paine there was a grave personal and property risk, much greater than in the case of the Hanna, for, although the latter had to deal with a drifting, rolling ship and in a dense fog, yet there was ample sea room to leeward, while the Paine was in a pocket from which there was no escape in case of an error of hand or judgment.

Both the Hanna and the Paine were so covered with ice that the man at the wheel could see nothing from the pilot house and had to be guided entirely by the orders from the bridge above.

Both masters have steadily and modestly refused to see or admit anything remarkable in their exploits and it is gratifying to note that the vessel owners of Cleveland, the home port of both ships, have declined to take that view of it, and have presented both with handsome gold watches properly inscribed as evidence of their appreciation.

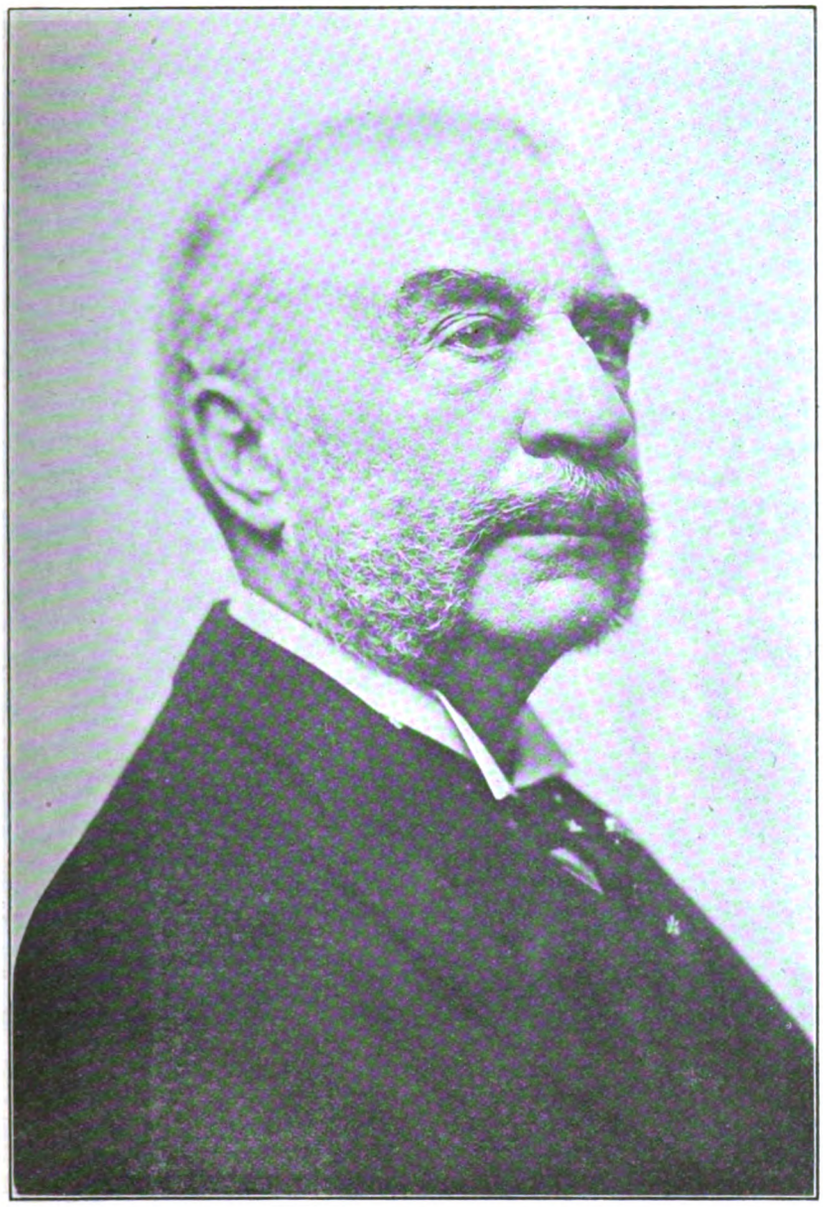
At the same time a similar token of esteem was presented to Capt. Fred Dupuie of the steamer F. M. Osborne in recognition of his splendid work in rescuing ten men from the wreck of the wooden steamer Geo. Stone, which, while bound up, loaded, struck Grubb's Reef in Pelee Passage in the early morning of Oct. 23 after fighting a losing battle with the S. W. gale all the previous day. Eight of the crew had attempted to make Pt. Pelee in a boat and only two reached shore alive. The Osborne was bound up, light, and Capt. Dupuie observed the wreck and distress signal about 11 a. m., when the wreck was fast breaking up and immediately responded. Being light there was great difficulty in keeping the ship's head to wind and sea at slow speed and Capt. Dupuie let go both anchors and practically duplicated the maneuver of the Paine, and not without danger to his own ship and crew. Three better examples of splendid seamanship would be difficult to find and their recognition reflects credit on both owners and masters.

Edwin Townsend Evans

EDWIN Townsend Evans, one of the best known transportation executives in the United States, died on Dec. 20 at the family residence, 189 North street, Buffalo. Mr. Evans was surrounded by the members of his family and the end came quietly and peacefully. A gentleman of the old school, with a personality and business ability that brought him unbounded success, Mr. Evans was seld in high esteem and greatly beloved by his friends.

Unpretentious in manner but with a determination of purpose, which characterized his whole life, Mr. Evans became a leader in transportation and business circles and up to the time of his death enjoyed the confidence and respect of all with whom he came in contact. While attending to the important and arduous duties as manager of one of the biggest and most important lines on the Great Lakes, Mr. Evans was at all times interested in the affairs of the city and took an active part in the work of the Buffalo Charity Organization Society. He was also greatly interested in music and art, and was a most comprehensive reader, his library being one of the choiciest in the country.

Edwin Townsend Evans, son of James Carey and Jane Townsend Evans, was born in Buffalo, Oct. 11, 1837. Joseph Ellicott, general agent of the Holland Land Co., who laid out the city of Buffalo, was his great-great-uncle. His father the late James Carey Evans, was engaged in lake and canal transportation from 1834 until within a few years of his death in 1901; and his maternal grand-



EDWIN TOWNSEND EVANS.

father, Jacob Townsend, was similarly prominent, in partnership with Sheldon Thompson and Alvin Bronson, mainly on Lake Ontario, from 1810, when he built his home on Lewiston Heights.

The business career of Edwin T. Evans, like those of his forbears, was long and without reproach. When only 22 years of age, in 1859, he had the confidence of the local banks to a degree that enabled him to buy on credit several steamers tied up by the failure of the American Transportation Co., of which his father was secretary and treasurer. This was the beginning of the old lake forwarding firm of J. C. and E. T. Evans, owners and managers of the Evans line of steamers, later known as the Erie & Western Transportation Co. (Anchor Line), which was bought by the Pennsylvania Railroad Co. some years later and has since been known as the Anchor Line. E. T. Evans was western manager of this company until 1903, when he was elected vice president of the company, an office which he held until it was abolished. He was succeeded as western manager by his son, James Carey Evans 2nd. E. T. Evans had the distinction of having built the first iron merchant steamer on the lakes, the Merchant, constructed in 1867.

He retained until his death the presidency of the Connecting Terminal Railroad Co., of Buffalo, and of the Western Warehousing Co., of Chicago. Mr. Evans was long known as the dean of the Lake Carriers and his reputation as an efficient and careful manager was never impaired either with the shippers of the lake region or with his principals. He was long on intimate terms with the guiding spirits of the Pennsylvania railroad and in important branches of its vast business his counsel was sought and prized.

With Frank J. Firth, formerly president of the Erie & Western Transportation Co., Mr. Evans was one of the organizers of the Lake Carriers' Association and for some years served as one of its directors.

PITTSBURG STEAMSHIP CO.'S MASTERS AND MATES.

The sixth annual meeting of the officials and captains of the Pittsburg Steamship Co. was held at the Hollenden, Cleveland, on Jan. 5, 6 and 7, President Harry Coulby presiding.

These meetings have been held annually since Mr. Coulby assumed the management of this company and have resulted in much good. Representatives from both upper and lower lake ports are present and all differences between the vessels and shipping and receiving docks that have developed in the year are discussed and satisfactorily adjusted. President Coulby emphasized the necessity of the master seeing that everyone aboard ship is treated fairly, saying that good results usually follow good treatment.

Hermon A. Kelley, counsel for the company, addressed the masters upon the rules of the road and lent especial importance to the observance of signals, as prescribed by law. Mr. Kelley viewed vessel signals not from the bridge but from the bench, and it is comforting when litigation arises that the vessel was navigating with due regard for the rules of the road. W. L. Varnum, who is in charge of the Cleveland hydrographic office, gave an instructive talk upon the compass.

The meeting, which was successful in every way, closed with a dinner at the Hollenden on Friday evening. Mr. Coulby acted as toastmaster and the speakers were W. P. Palmer, James H. Hoyt, H. A. Kelley and Capt. D. Sullivan, of Chicago. Mr. Coulby announced the following appointments of masters and mates for 1910:

PITTSBURG STEAMSHIP CO.

Masters.

Steamer.	Master.
Baker	George A. Bell.
Buffington	Richard Jollie.
Cole	J. W. Morgan.
Pinkey	W. J. Hunt.
Lynch	C. J. Grant.
Morgan	E. J. Crowley.
Phipps	W. B. MacGregor.
Ream	A. C Chapman.
Rogers	S. C Allen.
Widener	Fred Hoffman.
Corey	E. A. Bailey.
Frick	C. Gegenheimer.
Gary	W. H. Moody.
Perkins	W. S. Heag.
Edenborn	R. F. Humble.
Ellwood	H C. Cummings.
Gates	James A. Walsh.
Hill	A. J. Talbot.
Poe	W. C. Iler.
Morse	John Nahrstedt.
Houghton	J. F. Parke.
Cornell	W. H. Kilby.
Harvard	M. K. Chamberlin.

ANNUAL DINNER OF THE PITTSBURG STEAMSHIP CO.'S OFFICIALS AND CAPTAINS AT THE HOLLENDEN, CLEVELAND, JAN. 7.

Steamer.	Master
Princeton	John Burns.
Rensselaer	C. D. Secord.
Malietoa	Frank Rice.
Bunsen	J. T. Gemmell.
Van Hise	F. C. Watson.
Murphy	George H. Bowen.
Shaw	H. Culp.
Mataafa	H. J. Regan.
Mauna Loa	James Burr.
Superior City	J. R. Noble.
Black	Andrew Hansen.
McDougall	T. J. Cullen.
Fairbairn	Geo. W. McCallum.
Fulton	C. G. Ennes.
Bessemer	A. C. Smith.
Siemens	W. P. McElroy.
Coralia	W. H. Campau.
Stephenson	H. G. Harbottle.
Watt	A. Montague.
Crescent City	Geo. Randolph.
Empire City	C. S. Boyce.
Maricopa	C. A. Weitzman.
Ericsson	Geo. Holdridge.
Linn	Geo. H. Banker.
Queen City	W. E. Stover.
Zenith City	A. R. Thompson.
Eads	J. C. Bell.
Rockefeller	A. G. McLeod.
Cort	Thos. Wilson.
Neilson	S. E. Meeker.
Maritana	Dan McGillivray.
Mariposa	Geo. G. Burt.
Gilbert	A. W. Burrows.
Briton	F. W. Light.
German	A. C. Moser.
Roman	W. J. Story.
Saxon	Allen Collins.
Corona	J. A. Ferguson.
Corsica	F. D. Selee.
Manola	G. W. Ames.
Mariska	W. E. Warner.
Maruba	Geo. O. Reece.
Matoa	H. Walper.
Marina	H. T. Kelley.
Masaba	F. L. Sawyer.

Steamer.	Master
Colgate	G. M. Ackley.
Mather	David Bouille.
Griffin	T. F. Zealand.
Joliet	Daniel Murphy.
La Salle	Kenneth McRae.
Wawatam	Nicol McLaughlin.
Schiller	J. A. La Framboise.
Morgan Jr	Neil Campbell.
Olcott	A. R. Robinson.
Palmer	A. P. Chambers.
Dickson	———.

Barge.	Master.
Smeaton	Alfred Baupre.
Fritz	J. Y. Sprowell.
Roebling	W. F. Cottrell.
Manila	J. R. Parker.
Marsala	James N. Ames.
Bryn Mawr	George B. Kendall.
Maia	J. H. Dissette.
Maida	A. Nordahl.
Holley	Donald Graham.
Bell	C. Mulholland.
Nasmyth	W. H. Dick.
Jenney	Robert Thompson.
Thomas	George J. Maloney.
Carrington	H. M. Saveland.
Corliss	A. S. Hand.
Krupp	F. H. Rae.
Manda	H. Harris Jr.
Martha	William McDonald.
Magna	H. M. White.
137	O. W. Holdridge.
Malta	Charles Gordon.
Marcia	P. Gustafen.

Mates.

Steamer.	Mate.
Schiller	Thomas Naden.
Morgan Jr	Charles R. Thrasher.
Olcott	Alex. S. Brown.
Dickson	———.
Palmer	C. M. Conkey.
Baker	J. A. Smith.
Buffington	George Young.
Cole	H. D. McLeod.

Steamer.	Mate.
Dinkey	H. W. McEwen.
Lynch	John Wharry.
Morgan	William Milliken.
Phipps	Martin E. Glenn.
Ream	J. N. Rolfson.
Rogers	J. H. Denner.
Widener	Joseph Hughes.
Corey	C. D. MacGregor.
Frick	James Jack.
Gary	P. H. Dunn.
Perkins	Fred Jones.
Edenborn	Tom A. Small.
Ellwood	J. Birmingham.
Gates	E. B. Shay.
Hill	C. E. Peters.
Poe	F. H. Mallory.
Morse	Wallace F. Brown.
Houghton	Harry J. Clegg.
Cornell	J. C. Murray.
Harvard	A. J. Sharrow.
Princeton	F. E. Gould.
Rensselaer	A. T. Conkey.
Malietoa	T. J. Coffey.
Bunsen	L. O. Sturtridge.
Van Hise	E. D. Reynolds.
Murphy	Charles Benson.
Shaw	E. F. Bernard.
Mataafa	F. H. Saunders.
Mauna Loa	W. W. Durkee.
Superior City	Andrew Grant.
Black	George E. Huckle.
McDougall	J. B. Allair.
Fairbairn	James Liddell.
Fulton	F. H. Parsons.
Bessemer	D. W. McLeod.
Siemens	Victor Tyler.
Coralia	G. W. Huntington.
Stephenson	George H. Stover.
Watt	H. D. Roach.
Crescent City	A. T. Patchett.
Empire City	F. J. Wade.
Maricopa	John F. Gray.
Ericsson	H. F. Forbes.
Linn	C. J. Kearns.
Queen City	A. A. Fowlie.
Zenith City	———.

Steamer.	Mate.
Eads	F. J. Hunt.
Rockefeller	F. W. Davis.
Cort	John A. Munson.
Neilson	A. J. MacLeod.
Maritana	H. W. Emigh.
Mariposa	C. L. Wilson.
Gilbert	H. D. Thompson.
Briton	John Campbell.
German	W. J. Dodge.
Roman	Edward J. Ziem.
Saxon	David Axford.
Corona	D. M. LeRoy.
Corsica	George Bolhouse.
Manola	C. S. Ferguson.
Mariska	John G. Endleman.

Steamer.	Mate.
Maruba	John McDonald.
Matoa	B. J. Miller.
Marina	J. M. Conlin.
Masaba	E. K. Male.
Colgate	John T. Taylor.
Mather	C. E. Bowerman.
Griffin	Harry Ashby.
Joliet	Homer W. Smith.
LaSalle	John D. Caldwell.
Wawatam	J. E. Kitchen.

PICKANDS MATHER & CO.

Steamer.	Master.
Samuel Mather	L. W. Stone.
J. C. Morse	A. H. Reed.

Steamer.	Master.
Amasa Stone	W. A. Reed.
D. O. Mills	D. H. Mallory.
Verona	James Jackson.
Crete	W. A. Williams.
Hemlock	John McNeill.
Adriatic	James S. Neal.
Calumet	C. C. Stewart.
Odanah	James D. McPherson.
Elba	C. W. Woodford.
Normania	Oscar Olsen.
Victory	Joseph Lowes.
Pathfinder	Ralph Nutting.
Barge Constitution	P. A. Peterson.
Sagamore	Frank Hebner.
Santiago	C. M. Van Gorder.

Question of Lake Insurance

THE Great Lakes Protective Association will meet in Detroit on Jan. 18 and 19. The Lake Carriers' Association will meet at the Hotel Cadillac on Jan. 20. Both of these meetings will be of extreme importance to lake trade. The Great Lakes Protective Association was formed at the last annual meeting of the Lake Carriers' Association to work out a plan of inter-insurance under which vessel owners carry a partial risk. This was placed at 5 per cent of the total risk. Lake vessel insurance during 1909 aggregated $80,000,000, of which 5 per cent would be $4,000,000. As far as the Great Lakes Protective Association is concerned losses are probably less than the premiums, as the association's risk was on bulk freighters only and would not share in such losses as the Clarion, Wissahickon and Marquette & Bessemer No. 2. However, losses in general have been so severe as to provoke the desire for a reorganization of the lake insurance business. It is clear that the insurance companies desire the business to be made fundamentally sounder, both as to classification of the vessel and its actual operation. It is understood that the Great Lakes Protective Association has accumulated much valuable data during the first season of its existence, which will be submitted at the forthcoming meeting. The New York *Journal of Commerce* on Jan. 6, published an article regarding lake insurance, together with an interview with W. A. Prime, in which the general situation is well outlined. The article is reprinted herewith:

The serious losses suffered in the shipping of the great lakes in the later months of last year have occasioned conjectures in shipping and insurance quarters as to the probability of an advance in rates. It was estimated that the disasters to the steamers Clarion, Wissahickon, Marquette and Bessemer No. 2 and Ashtabula involved a loss of more than a million dollars. In these losses English underwriters have been heavily interested, but it is understood on this side that the question of making any alteration in the rates in consequence has not yet been taken up by those who fix them.

The shipping losses of last year have served to emphasize the necessity of organizing the whole business of the great lakes shipping insurance on a comprehensive, definite and sound basis according to a similar system to that followed in the case of ocean shipping. The lack of uniform inspection and registration of vessels, with the attendant multiplication of risks, led to the withdrawal of several marine insurance companies from the field. A great step forward was made by the formation of the Great Lakes Protective Association at the meeting of the Lake Carriers' Association a year ago. The maintenance of a complete register of great lakes shipping and the collection of accurate data with regard to vessels, losses, navigation and navigators on the pattern of Lloyds Register, are fundamental requisites. During the past year very full records have been kept for the association, which will enable it to carry out its purposes more completely. But it has not yet been able to tackle the vast question of classification of ships based on construction on scientific principles.

There are many ships employed on the lakes built before the compilation of the present register, now leased to American and English underwriters, was begun 12 years ago. The association has confined itself to the draughts of vessels, control of crews and rules for navigating waters and locks with much success.

In regard to the great lakes losses of the past quarter it would appear that on the policies issued in 1909 the losses are considerably less than the earned premium, so far as the Great Lakes Protective Association is concerned. The association, however, was not directly affected by the losses on the vessels named above, as it had issued no policies upon them, owing to the fact that the membership of the Protective Association is made up of the coarse carriers and does not at present insure railroad transit line steamers, passenger steamers or car ferries, to which classes these vessels belonged.

The Protective Association meets at Detroit, Jan. 18. Its main purpose is to bring about safer navigation on the great lakes and to minimize, through care, the number of accidents. This will tend to the reduction of risks and insurance rates, explained W. A. Prime, to a representative of *The Journal of Commerce*, when asked to detail the objects of the Protective Association.

"It's purpose," said Mr. Prime, whose firm, Messrs. Willcox, Peck & Hughes, are the attorneys for the association, "is to let every ship owner on the lakes, by being a member of the Protective Association, which collectively insures 5 per cent of the value of a ship, receive a statement annually showing him exactly what disposition is made of the premium paid for insurance. He, therefore, can know as much as any insurance company knows and is able to determine thereby whether rates should justly go up or down in accordance with profits or losses as shown in his statement.

"To supply accurate data showing the position of insurance business on the lakes is another object. But the Protective Association's scope is far broader than that.

"Since rates are excessive it has undertaken for the first time and has successfully accomplished in one season the establishment of what practically amounts to a Plimsoll mark or load line on the lakes.

"Heretofore all attempts from all quarters to regulate the load of a ship have failed. Even suggestions by the government have been opposed, but when it was clearly pointed

out by the Protective Association that one of the most serious causes of loss from year to year was the disregard on the part of owners to the draught of water at the various crossing places on the lakes it was at once determined that the Lake Carriers' Association should undertake the task of publishing at the loading port the exact draught in feet and inches which vessels might load to in order safely to pass through the locks of Sault Ste. Marie, Lime Kiln crossing and other dangerous places, and to indicate at what draught vessels might safely enter ports like Conneaut, Ashtabula and Fairport, to say nothing of the Niagara river and Welland canal.

"Furthermore, to see that these recommendations were properly respected checkers were posted at the Canadian and American locks at Sault Ste. Marie to note carefully what all vessels were drawing as they passed through the locks, notations being made of each ship forward, aft and amidships.

"The immense consequences of this action can scarcely be computed at the present time, but it is bound to follow that losses by strandings will in the end cease to be one of the menacing causes affecting the rate of insurance upon the lakes.

"Another important work undertaken by the Protective Association is the supervision of masters, officers and seamen upon lake vessels. Again acting in conjunction with the Lake Carriers' Association, who recently devised a system of certification of master mariners, etc., the Protective Association undertakes inquiries into the causes of disaster much as does the English Board of Trade."

In Behalf of Our Merchant Marine

CONGRESSMAN William E. Humphrey, of Washington, introduced the ocean mail bill in Congress on Jan. 4 and it was referred to the committee on Merchant Marine and Fisheries.

The proposed bill contains three distinct propositions. First: To increase the mail pay to American ships on routes to South America, China, Japan, the Philippines and Australasia, to $4 per mile outward voyage, where the voyage is 4,000 miles or more. Second: To increase the tonnage taxes on the trans-oceanic trade. Third: Free ships; that is, to admit foreign-built ships to American register for the foreign trade.

The first of these propositions is the most important. It is proposed by this section to amend the act of March 3, 1891, so that on voyages of 4,000 miles or more to South America and the Orient the Postmaster General may be authorized to pay second class ships for carrying the mail the same rate of pay now authorized to be paid to first class ships—that is, $4 per mile outward voyage.

There is but one American vessel flying the stars and stripes, engaged exclusively in the foreign trade, but what is running under the provisions of this law. Eighteen years of experience has demonstrated that this law will not secure vessels to run on the long voyages to South America and across the Pacific. A first-class vessel under the terms of 1891 is one of 8,000 tons or over, with a 20-knot speed. A second-class vessel is one of 5,000 tons or over with a 16-knot speed. This is the only difference, but it costs much more to run a 20-knot vessel than a 16-knot vessel, and it costs more in proportion to its earning capacity to run a vessel on a long than a short voyage.

Our tonnage taxes are among the very lowest of the nations of the world. It is proposed to increase the tonnage taxes only on vessels in the trans-oceanic trade. In this trade there are but few American vessels. Last year the dues paid in this trade amounted to $884,377. Of this sum American vessels paid only $34,419, so that American vessels paid less than 4 per cent. American vessels, by carrying American boys, one for each 1,000 tons of the vessel, can have rebated 80 per cent of their tonnage dues, which will considerably reduce them below the present rate, so that American ships will have their dues reduced. If this section is adopted it will bring into the national treasury about a million dollars per annum and every dollar of this amount will be paid by foreign ships.

Under the third provision, that of free ships, any American citizen can buy a vessel, built anywhere, and get the American flag to run it exclusively in the foreign trade; such vessels are not to receive any government aid. Not a single vessel is being built in the United States for the foreign trade and has not been for more than seven years, so no ship builder can complain of this provision. Not a single American vessel would be displaced or have increased competition, so no one operating American vessels can possibly be injured.

The National Association of Manufacturers, through its committee on merchant marine, has adopted resolutions recommending to Congress the immediate passage of an ocean mail bill providing for sufficient postal compensation to establish a swift and regular service in American built steamships to the principal countries of South and Central America and to the ports of Australasia, Japan, China and the Philippines. The January issue of *American Industries*, the association's official organ, is devoted almost entirely to the presentation of facts favoring the above policy, saying editorially:

"The attitude of the National Association of Manufacturers in giving its approval to the efforts in behalf of an adequate merchant marine, is based entirely on business. The association believes that a greater trade and a corresponding industrial benefit will come from the rebuilding of an American merchant marine in American shipyards for the purpose of carrying American-made goods to other countries. The association does not believe in registering foreign-built vessels.

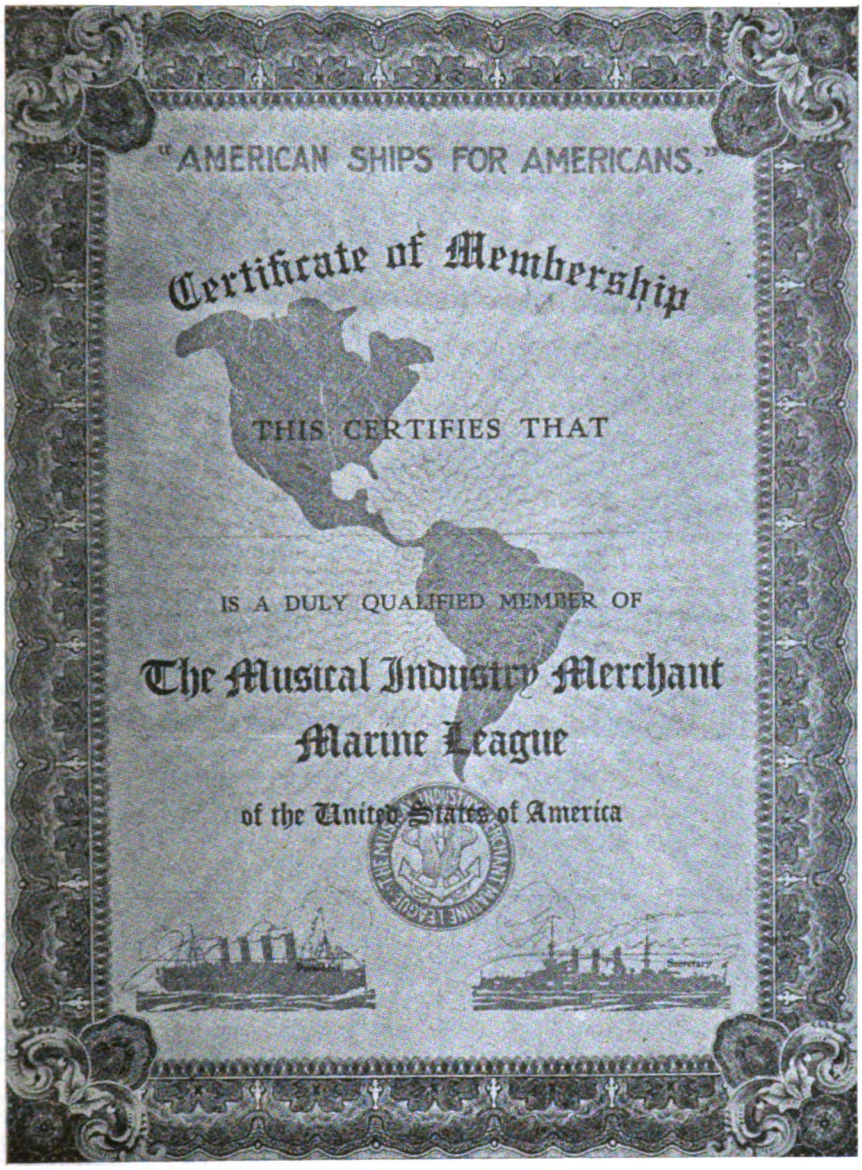
"The demand for an adequate American merchant marine is based upon a purely business view of conditions. The average American manufacturer not only believes—he knows—that a great fleet carrying the mails and cargo to foreign ports will mean an increased foreign trade and an increased production of domestic goods extending through innumerable channels. Beyond this, of course, is the increase of our prestige as a nation."

The Merchant Marine League of Louisiana met at the Progressive Union Hall and adopted a constitution. The following resolution was adopted:

"Whereas, the carrying trade for the products of the United States is almost entirely in the hands of other countries, who control foreign markets by means of subsidized ships, and,

"Whereas, no relief can come to the manufacturers, merchants and farmers of the United States until the American flag may be found floating from merchant vessels on every sea and in every foreign port; therefore,

"Be it resolved by the Merchants' Marine League of Louisiana, That congress be memorialized and requested to enact such legislation as will tend to the re-establishment of



FACSIMILE OF CERTIFICATE OF MEMBERSHIP SENT TO MEMBERS OF THE MUSICAL INDUSTRY MERCHANT MARINE LEAGUE.

the American merchant marine in such form as will advance the mercantile and other interests of the United States, and that copies of this resolution be sent to the senators and representatives of Louisiana in congrss, with the request that they present same to the senate and house of representatives, and support such bill or bills having the above purpose in view, and as may best cause laws to be enacted on the subject."

The Musical Industry Merchant Marine League is a most progressive body. Organized by the New York piano trade at the Hotel Astor in October, its membership has rapidly spread throughout the entire United States. It has been organized to further the upbuilding of the American merchant marine in foreign trade, the specific complaint being that piano manufacturers cannot reach South American markets with their instruments. Since October a most progressive campaign has been carried on through its secretary, George W. Gittins, who has sent to every piano manufacturer in the country an appeal for membership The responses have been amazing, for while the Musical Industry Merchant Marine League is only two months old, it has several hundred members. The league has also issued a pamphlet of eighty pages entitled, "The American Ship," in which the entire history of the American merchant marine is reviewed from the historical standpoint. Everyone who desires to familiarize himself with the rise and decline of the American merchant marine has but to read this pamphlet. Over 4,000 of these pamphlets were mailed by the league to the musical industry, both wholesale and retail, throughout the United States. Copies of the Humphrey bill have also been sent to the trade in order that they may be familiar with what is contemplated in the way of legislation. Every musical trade paper in the country has taken up the subject and indorsed it heartily.

Secretary Charles Nagel, of the Department of Commerce and Labor, earnestly recommends in his annual report for 1908 the rehabilitation of the American merchant marine in the foreign trade. It does seem surprising that with recommendation after recommendation from heads of departments and from president after president, that congress is so reluctant to do anything. Those who thoroughly understand the situation know how urgent the need is. If every congressman would investigate the subject upon its merits he would be in favor of immediate action. Upon this subject the Secretary of the Navy says:

Our shipping registered for foreign trade on June 30, 1909, consisted of 1,633 vessels of 887,505 gross tons, but even these modest figures are an overstatement of our resources in international competition. They include a number of vessels which have outlived their usefulness and others which, though registered, are engaged in trades from which foreign ships are excluded. For effective competition in foreign trade any one of several of the great British and German steamship companies is better equipped than the entire steam fleet in that trade under the American flag. If a change in our policy of restricting the national register to vessels built at home alone would remedy this situation, few would oppose such a change. It is significant, however, that during the past year three of our trans-Atlantic steamships, built recently in the United States, were transferred to the Belgian flag.

At the beginning of the current fiscal year we had only four American steamships regularly engaged in European trade, only five in trade with Asia, and none with South America below the Caribbean, or with Australia or Africa. Under existing conditions the number will not increase and may decrease. Last year our exports and imports by sea in round numbers amounted to $2,721,000,000, of which only $258,657,000, or 9.5 per cent, was carried in American ships.

The Commercial Secretaries' Association at its convention held in San Antonio recently, adopted the following resolution:

"We declare in favor of the passing of a bill similar to the Humphrey bill for the rehabilitation of the United States Merchant Marine."

COMMERCIAL BOILER WORKS ACTIVE DURING 1909.

A large number of Pacific coast vessels were fitted with new boilers or furnaces during the past year by the Commercial Boiler Works, Seattle. Seven large Scotch marine boilers, none of them less than 10 ft. 6 in. by 10 ft. 6 in., and four of them 15 ft. in diameter, were built for the following steamships: One for tug Lorne; two for schooner Lindsay; four for steamship Northwestern. In addition to this, externally fired boilers were built for the Alaska river steamers Tana, Minneapolis and Altona. New furnaces were fitted to the boilers of the Puget sound steamers, Indianapolis and Utopia, also to the United States lighthouse tender, Heather. The boilers of the old steamship, Victorian, were retubed. Stacks and breechings were built for the new fireboat Duwamish.

The largest repair job on the western coast during the year, which consisted in building an entirely new bottom on the Norwegian steamship, Eir, was executed by the Commercial Boiler Works, who also made extensive repairs to the steamers Olympia, Northwestern, Heather, Chicago, Leelanaw, Columbine and Gen. Wilson. Fuel oil tanks were installed in the ocean steamers Plieades and Hyades, as well as in several other vessels.

Speaking of general conditions, the firm reports a better volume of business during the past year than in 1908. Prices, however, have been poor, and have not improved over those prevailing 14 months ago. In the meantime plates, rivets, etc., have experienced a sharp advance, which is cutting down the margin of profit for Pacific coast boiler shops and marine repair firms. An increasing volume of business is expected during 1910, but what is better from the manufacturers' standpoint, an advance in prices is expected, both for repair work and new construction.

CUNARD APPOINTMENT AT NEW YORK.

Percy Whatmough, private secretary to the general manager of the Cunard Steamship Co., has been appointed to take charge of the Cunard passenger business of New York, a position of great importance. Mr. Whatmough, who is quite a young man, has been brought up in the Cunard service, having been already 20 years in their employ. He has proved himself a most capable secretary and has won golden opinions of all with whom he has come in contact, for his urbanity, tact, and obliging manner on every occasion. He was secretary to Mr. Boumphrey in the now apparently old days; he discharged the same duties for the late Mr. Morehouse, and still holds under the present general manager, A. D. Mearns, the office he has filled so well. He has served under five Cunard chairmen: The first, Lord Inverclyde (then Sir John Burns), David Jardine, the second Lord Inverclyde, William Watson and the present chairman, A. A. Booth. He will arrive in New York and take up his new office early in February.

PERCY WHATMOUGH.

FERRY FRANCHISES AT OGDENSBURG.

On page 113 of this issue will be found the advertisement of the city of Ogdensburg offering to lease three valuable ferry franchises. The advertisement reads that bids for the franchises can be received up to Jan. 4, 1910. This should read that bids for the franchises can be received up to March 31.

The Northern Engineering Works, Detroit, Mich., has purchased additional land adjoining their plant on which it is expected that extensions to their crane plant will be made during the coming season.

The Kent plant of the Seneca Chain Co. was destroyed by fire on Dec. 10, the company immediately transferring its business to its plant at Mansfield with two shifts. The Kent plant is being rapidly rebuilt.

Accidents to Lake Vessels During 1909

HEREWITH is published the list of accidents to the lake fleet during the season of 1909, together with table of vessels totally lost. The total losses number 34, of which 23 were steamers, 6 were schooners, 4 tugs and 1 car ferry. Of the total losses 15 were destroyed by fire, 14 wrecked in storms, 4 sunk in collisions, and one cut through by ice. One hundred and nine lives were lost, 7 on the tug Floss, 5 on the Eber Ward, 7 on the George Nester, 14 on the Adella Shores, 15 on the John B. Cowle, 5 on the George Stone. 3 on the tug Princeton, 1 on the Louis Pahlow, 15 on the Clarion, 5 on the Richardson, and 32 on the car ferry Marquette & Bessemer No. 2. Three vessels were abandoned by the underwriters as constructive total losses, the James H. Hoyt, the Henry Steinbrenner and the W. C. Richardson, though in all probability they will be raised and repaired.

Of the causes, collisions lead with 41, followed by fire with 20, while deranged steering gear and consequent strandings has its usual quota.

The first serious loss of the season was the sinking of the old steamer Eber Ward in the Straits of Mackinaw on Apr. 20. This was one of the most singular accidents that has ever happened on the lakes, being the only instance on record in which a steamer was actually sunk as the result of colliding with an ice floe. The Steamboat Inspection Service, which investigated the wreck, concluded that the Ward's bows were crushed in through impact with heavy ice, causing her to sink.

The steamer Aurania was caught in the storm of Apr. 30 on Lake Superior and sank in Whitefish Bay, her crew managing to escape.

The old steamer Russia was sunk near Detour through the shifting of her cargo during a storm.

The same storm that sunk the Aurania also wrecked the Adella Shores, though it was a week later before any

of her wreckage was found floating about the lake.

Of course, the most sensational accident of the year was the forcing open of the lower gate of the Canadian lock at Sault Ste. Marie by the steamer Perry G. Walker, of the Gilchrist Transportation Co.'s fleet about noon on Wednesday, June 9. The Walker, bound up loaded with coal, was approaching the lock from below but had not yet made fast below the lock as customary. Through some error of judgment or misunderstanding of signals she was driven into the south gate of the lock at an estimated speed of between five and six miles per hour. The forcing inward of one gate even slightly removed from the other the support afforded by the mitered ends and the head of water behind it immediately carried it down stream, followed of course by the other. The Canadian steamer Assiniboia, bound down, was in the lock, made fast, her position of course being close to the lower gates. The Pittsburg Steamship Co.'s steamer Crescent City, carrying about 7,000 tons of iron ore, was entering the lock and had not entirely cleared the upper gates. The rush of water carried the Walker back along the south wall of the lower approach. The Assiniboia, of course, dropped with the water in the lock, snapping her mooring lines and then carried out of the lock with the rush of water, struck the Walker on the starboard side, forcing the latter around parallel with the south canal bank. The captain of the Assiniboia then let go an anchor, which proved to be unfortunate, as will be seen. The Crescent City was, as stated, just entering the lock chamber and was consequently immediately over the upper sill. The water dropping out of the chamber lowered her bow so that the current rushing in through the restricted passage along her sides washed over her forward deck; but gathering headway rapidly she shot over the sill and settling into the chamber, submerged momentarily, her after deck, and was then shot through the chamber and down stream where she fouled the Assiniboia, the latter's stem cutting a serious gash in the Crescent City's port bow. Both the Walker and the Assiniboia took the ground and the Crescent City crossed to the American side and was beached. The Walker's damages were unimportant consisting of shoe and rudder and slight damage forward. The Assiniboia had 24 damaged plates. The Crescent City, however, was the worst case of damage that has ever occurred on the lakes. Two hundred frames and all her bottom plates were broken. That she did not actually break in two in passing over the upper sill is nothing short of marvelous.

The steamer John B. Cowle was sunk in collision with the steamer Isaac M. Scott off Whitefish Point on July 12 in a dense fog. The Cowle was struck amidships and sank almost immediately, drowning 15 of her crew.

Among the total losses by fire were the steamer Benton, steamer City of Green Bay, steamer Monteagle, tug Columbia and steamer Samoa.

The Monteagle had an especially unfortunate career. She struck a submerged crib in Mud lake and sank in 16 ft. of water. After she had been raised and repaired sufficiently for her trip to dry dock she caught fire and became a total loss.

The steamer George Stone struck hard on Grubb's reef, near Point Au Pelee, on Oct. 23, after having battled with a gale for 24 hours preceding. Fire added to their danger, burning the pilot house to the deck before it was subdued. The Stone broke up gradually. Six members of the crew who attempted to reach land in a small boat were drowned. Meanwhile the Stone's signals of distress were responded to by the steamer Frank M. Osborne, Capt. Fred Dupuie, master. Capt. Dupuie bore down on the lee side of the Stone, but as she was light it was difficult to hold her against the gale. Capt. Dupuie thereupon dropped both anchors and dragged them until he had pushed the Osborne's nose against the after deck of the Stone. A ladder was then put out and the crew taken off.

The last trip of the season was the wildest of all and resulted in greater losses both of life and property than for any month preceding. Especially dramatic was the burning of the old wooden steamer Clarion, of the Anchor line, at Southeast Shoal, Dec. 8, and the wreck of the W. C. Richardson off Buffalo, particulars of which will be found elsewhere in this issue.

It was in this storm that the car ferry Marquette & Bessemer No. 2, operating between Conneaut and Port Stanley, was lost with all on board.

Omitting total losses, the more serious and costly accidents included the stranding of the steamer E. J. Earling on Madeline Island, Lake Superior, on May 27; the accident to the Crescent City on June 9 in which she was swept through the Canadian canal at the Sault when the lower gate was wrecked, entailing a repair bill of about $125,000; the Scott-Cowle collision on July 12, when the steamer Cowle was sunk and the Scott spent two weeks in dry dock, at a cost of about $25,000; the grounding of the steamer Pathfinder on Aug. 8 off Eagle river, Lake Superior, when she was rammed by the barge Sagamore which she was towing; the collision between the steamer's Senator and Norman B. Ream, the Senator having many plates damaged and many frames broken; the Collingwood-Craig collision in the Detroit river on Aug. 24, when the Collingwood sank owing to the severe injury sustained; the collision between the

VESSELS LOST DURING THE SEASON OF 1909.

Name of Vessel	Cause	Where lost	Carrying Capacity Gross Tons
		Steamers	
Aurania	Foundered	Whitefish Bay, Lake Superior	3,218
Benton	Fire	River Rouge, Mich.	304
City of Green Bay	Fire	Saginaw Bay	258
Clarion	Fire	Off Southeast Shoal, Lake Erie	1,711
Cowle, John B.	Collision	Off Whitefish Point, Lake Superior	4,731
Falcon	Stranded	South Fox Island, Lake Michigan	865
Flint	Fire	Off North Point, Lake Superior	835
Hinton, Francis	Stranded	Lake Michigan	417
Iron Age	Fire	Detroit River	1,111
Meyer, F. A.	Cut by Ice	Lake Erie, off Port Colborne	1,261
Monteagle	Fire	Mud Lake, St. Marys River	1,253
Ottawa	Foundered	Off Passage Island, Lake Superior	...
Pridgeon, John Jr.	Storm	Off Cleveland, Lake Erie	1,171
Richardson, W. C.	Foundered	Lake Erie, off Buffalo	3,813
Rome	Fire	St. Mary's River	1,517
Russia	Storm	Near Detour, St. Mary's river	1,551
Samoa	Fire	Osceola Lake, Torch Mills	1,096
Shores, Adella	Storm	Lake Superior	731
Stone, George	Storm	Off Point Pelee, Lake Erie	1,811
Tecumseh	Fire	Goderich, Ont.	.....
Tempest No. 2	Fire	Parry Sound, Ont.	367
Thew, W. P.	Collision	Off Thunder Bay Island	206
Ward, Eber	Heavy Ice	Straits of Mackinac	1,343
		Schooners	
Gebhart	Fire	Georgian Bay	351
Maxwell, E. B.	Stranded	Lake Erie	.....
Nester, George	Storm	Lake Superior	790
Schnette, John	Collision	Lower Detroit River	269
Spademan, Charles	Foundered	Lake Erie	335
Van Straubenzie	Collision	Off Dunkirk, Lake Erie	317
		Tugs	
Augusta	Fire	Port Dalhousie, Ont.	57
Columbus	Fire	Gargantua, Ont.	.....
Ottawa	Fire	Lake Superior	617
Penelope	Fire	Lake Erie	54
		Car Ferries.	
Marquette & Bessemer No. 2	Foundered	Lake Erie	2,514

steamer Lackawanna and barge Chieftain abreast of Port Huron Sept. 18, badly damaging the Lackawanna; the stranding of the steamer John B. Trevor in a storm at Grace Harbor, off Isle Royal, Lake Superior; the stranding of the Canadian passenger steamer Athabasca on Flower Pot Island, Georgian Bay, on Oct. 14; the crippling of the Poe lock at the Sault by the steamer I. L. Ellwood, Nov. 10; the collision between the steamer Charles Weston and Ward Ames, at the Sault, on Nov. 13, both steamers having to be docked as a result; the stranding of the steamer Hoyt on Lake Superior near Outer Island, on Nov. 13, where she remained fast until Nov. 29, when she was released and towed to Superior; the collision of the steamer Odanah with a pier in Duluth ship canal, on Nov. 15; the sinking of the schooner Commerce on Lake Michigan, on Nov. 16; the stranding of the steamer Bransford on Isle Royal, Lake Superior, on Nov. 18, necessitating a two weeks' stay in dry dock; the collision between the steamers Frank C. Ball and Hoover & Mason, in Lake St. Clair; the Steinbrenner-Berwind collision at Round Island, Mud lake, on Dec. 6, the Steinbrenner being abandoned by her owners to the underwriters and the damage to the Berwind being estimated at $30,000; the grounding of the barge Hartnell on Bois Blanc Island, Detroit river, on Dec. 7, her injuries making it necessary for her to winter at Detroit; the stranding of the car ferry Ashtabula off Port Burwell, Dec. 12; the stranding of the package freighter Wissahickon on Outer Duck Island, Lake Huron.

CHRONOLOGICAL RECORD OF ACCIDENTS TO LAKE VESSELS DURING THE SEASON OF 1909.

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	LOCATION.
Jan. 16	Str. Tecumseh	Burned at a lumber dock, where she was frozen in for the winter; hull sank in 20 ft. of water	Goderich, Ont.
Jan. 22	Tug Gunderson Bros.	Ran on beach in dense fog	Near Kenosha, Lake Michigan.
Jan. 25	Carferry Ann Arbor No. 4	Ran ashore, docked at South Chicago for repairs	Lake Michigan.
Feb. 1	Str. Geo. H. Russel	Sprang leak while tied up for winter; several feet of water in hold; pumped out	Buffalo breakwater.
Feb. 1	Str. Frank J. Hecker	Sprang leak while tied up for winter; pumped out	Buffalo breakwater.
Feb. 10	Str. Price McKinney	Broke from her moorings; hawser parted; damage, $2,000	Milwaukee.
Feb. 23	Carferry Milwaukee	Ran aground; released after transferring 12 cars to Str. Grand Haven	North Point.
Apr. 7	Str. Wm. H. Truesdale	Driven on sand bar by ice jam; lightered half of cargo and released by Str. Favorite, after 70 hours' work	Buffalo.
Apr. 8	Str. Maricopa	Damaged by fire; damage, $150	Lorain.
Apr. 8	Str. Jas. H. Shrigley	Torn from her moorings by severe wind storm and hit by barge Quale, which was also blown adrift; cabin shoved out of position and number of stanchions broken	River Rouge.
Apr. 8	Str. Emma E. Thompson	Broke wheel by striking sunken barge Bissell while backing out of harbor	Alpena harbor.
Apr. 8	Tug Geo. A. Floss	Caught in wind storm; seven lives lost; raised and retained	Lake Erie.
Apr. 9	Str. Republic	Fire in hold; loss, $100	Milwaukee.
Apr. 9	Bge. Twin Sisters	Crushed in ice jam and sunk with cargo of coal valued at $6,000	Near Ogdensburg.
Apr. 16	Tug Daisy	Damaged by fire; cabins and boiler room burned and machinery badly damaged	Lorain.
Apr. 17	Str. Siemens	Lost an anchor which was later an obstruction to navigation	Toledo.
Apr. 18	Bge. E. A. Shores	Began to leak shortly after leaving Port Huron and was beached on Stag Island; bad list; full of water	St. Clair river.
Apr. 20	Str. Eber Ward	Struck heavy ice floe and sunk; five of crew drowned; steamer total loss; str. and cargo valued at $60,000	Straits of Mackinac.
Apr. 22	Carferry Michigan	Collided with Str. W. P. Walsh; much of upper works torn away and engines crippled	Detroit river.
Apr. 22	Str. James P. Walsh	Collided with carferry Michigan; not seriously damaged; lost anchor	Detroit river.
Apr. 22	Str. Ogdensburg	Struck obstruction; No. 1 port and starboard tanks leaked	Straits of Mackinac.
Apr. 25	Str. Houghton	Grounded; several holes in starboard side; docked at Loram; repairs completed May 11	St. Mary's river.
Apr. 30	Str. Aurania	Caught in ice in storm; leaked badly and sank; crew escaped	Whitefish Bay.
Apr. 30	Str. Powell Stackhouse	Forward cabin broken in by gale	Lake Huron.
Apr. 30	Str. Pridgeon	Lost her stern bearings in gale	Straits of Mackinac.
May 1	Schr. Geo. Nester	Foundered on rock in severe storm; crew of seven drowned; went to pieces in 15 minutes; total loss	Lake Superior.
May 1	Str. Russia	Sank in storm; cargo shifted; crew rescued	Near Detour.
May 1	Str. Superior	Wheel broken by ice; towed to Sault for repairs	Whitefish Bay.
May 3	Str. Edwin F. Holmes	Struck dredge working on new tunnel; hole in dredge; several plates damaged; docked at Toledo for repairs	Detroit river.
May 3	Str. Selwyn Eddy	Ran aground; lightered; leaked; released on 6th	Niagara river.
May 4	Str. New York	Ran aground; blocked entrance to channel	Ludington harbor.
May 4	Str. Ericsson	Damaged by ice; repaired at Superior	Whitefish Bay.
May 4	Str. Adella Shores	Wrecked in big storm; wreckage found floating about after she had been missing a week; fourteen lives lost	Lake Superior.
May 8	Str. Chicago	Ran aground; leaked badly; stopped at St. Ignace where two air compressors were put aboard, then continued to Buffalo	Straits of Mackinac.
May 8	Str. Morrell	Steering gear disabled; towed to Sault, where she was temporarily repaired	Abreast of Point Aux Pins.
May 12	Str. Geo. H. Russel	Collided with Str. Thomas Barlum, while being towed out of harbor; hole 4 ft. long in port bow; considerably damaged; docked at Cleveland June 2; repaired in two weeks	Buffalo.
May 12	Str. Thos. Barlum	Collided with Str. Geo. H. Russel; lost anchor and stern damaged, but continued on trip	Buffalo.
May 12	Str. Wasaga	Ran aground; released after lightering several thousand bu. of grain; bow out about 20 in.; quite badly damaged	Middleground, Sault.
May 12	Str. Turret Crown	Stopped at Sault to have patch put on amidships, resulting from collision with Str. Midland Queen	Goderich, Ont.
May 14	Bge. Fritz	Towing machine broke as she was leaving locks; towed to Cleveland for repairs	Sault Canal.
May 15	Schr. Melitta	Beached in thick fog; released on 17th and towed into Sheboygan harbor	Lake Michigan.
May 15	Str. James Hoyt	Explosion in engine-room; three men scalded; repairs completed at Cleveland June 25	Lake Erie.
May 16	Schr. Arenac	Sprang leak while out in storm; cabins badly smashed and all belongings of crew lost, bad list and water-logged; reached Marquette just in time to preven her from sinking in deep water	Lake Superior.
May 17	Str. Chili	Ran aground; out about 2 ft.; three holes on bottom; forepeak full of water; temporarily repaired at the Sault	Round Island, Lake Superior.
May 17	Str. Gargantua	Ran through lock No. 21 and carried away two upper gates and one lower gate	Welland Canal.
May 19	Str. Mathew Wilson	Broke her crank pin; engine badly damaged; stopped to make repairs	St. Clair river.
May 20	Str. J. S. DeGraff	Collided with Str. Sonora; two damaged plates	Buffalo.
May 20	Str. Sonora	Collided with Str. DeGraff	Buffalo.
	Str. J. J. Hill	Collided with Str. Troy	Duluth.
	Str. Troy	Collided with Str. J. J. Hill; slightly damaged	Duluth.

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	LOCATION.
May 24	Str. Western States	Collided with tug Princeton	Buffalo.
May 24	Tug Princeton	Collided with Str. Western States; three lives lost; overturned and sunk; raised June 3	Buffalo.
May 27	Str E. J. Earling	Ran ashore in fog; pretty badly damaged; docked at Superior; forty plates replaced; repair bill about $25,000; finished June 15.	Madeline Island, Lake Superior.
May 27	Str Monteagle	Collided with unknown steamer; slightly damaged on port bow.	Near Thunder Bay Island.
May 29	Carferry Ann Arbor No. 4	Turned turtle while loading a train of iron ore cars; floated June 22 and towed to Frankfort; docked at Milwaukee July 17	Manistique.
May 31	Str. Joliet	Ran ashore; out 1 ft. forward and forepeak full of water; released after lightering 400 tons; docked at Cleveland; 14 damaged plates	Summer Island.
June 3	Str. Prince Rupert	Lost an anchor	Limekiln Crossing.
June 4	Str. Iron Age	Burned to water's edge; crew lost all of their effects; loss estimated at $22,000	Detroit river.
June 4	Str. Roman	Ran ashore in fog on rocky bottom; released on 8th; 17 plates damaged; docked at Cleveland June 15; completed repairs June 22	Near Detour.
June 4	Bge. Krupp	In tow of Str. Roman; crashed into her when she stranded; bow considerably damaged; repaired at Superior	Near Detour.
June 4	Bge. Gebhart	Totally destroyed by fire while lying at Drummond Island	Georgian Bay.
June 6	Str. Tampa	Struck an ore dock, demolishing spout	Escanaba.
	Str. Calumet	Struck; repaired at Lorain; five plates taken off	Lake Superior.
June 9	Str. Perry G. Walker	Broke through lower gate owing to misunderstanding of signals; whirled around several times, finally landing on a shoal; hole ripped in side by Assiniboia's anchor; docked at Superior; not badly damaged	Canadian Canal, Sault.
June 9	Str. Crescent City	Swept through canal by great rush of water as she was about to enter; big hole torn in her side as she passed broken gate; settled on bottom on American side where tugs caught her; raised June 14; repaired at Toledo; 200 frames broken and all bottom plates damaged	Canadian Canal, Sault.
June 9	Str. Assiniboia	Torn from her moorings by Str. Walker; several plates on port side forward to amidships were loosened	Canadian Canal, Sault.
	Str. Elba	Struck breakwater; 13 damaged plates; repaired at Toledo	Cleveland.
June 11	Str. Arundel	Ran on beach; released herself; slightly injured; repaired at Lorain	Lake Erie.
June 14	Str. Wyoming	Grounded on rock bottom; released on 15th; lost shoe; rudder disabled; repaired at Reid's, Port Huron; repairs included number of new planks, part of keel, stern post and rudder	Limekiln Crossing.
June 22	Str. W. P. Thew	Sunk by Str. Livingstone (large) in fog; little insurance; loss $10,000	Off Thunder Bay Island.
June 22	Str. Joshua W. Rhodes	Struck bottom; reached Soo on 22nd. with one tank leaking; docked Superior June 25; seven plates damaged; repairs completed July 3	South Manitou Islands.
June 24	Str. Wm. Mills	Ran aground; released by tug; 15 plates repaired; docked at Lorain	Straight Channel, Toledo, O.
June 25	Str. Kearsarge	Boiler burned; repaired at South Chicago; licenses of chief and assistant engineers revoked; damage, $25,000	Depot Harbor. Ont.
June 26	Str. City of Racine	Lost her wheel; summoned aid by wireless; towed to Chicago by Str. Christopher Columbus	Off Fort Sheridan, Lake Michigan.
June 28	Str. Tempest No. 2	Burned to water's edge; fire believed to have started from overheated boiler; hull sank in deep water; boat valued at $8,000	Parry Sound, Ont.
June 30	Bge. Antrim	Ran aground; released after lightering 500 tons of cargo	Head of Stag Island.
July 1	Ferry Str. Jno. Hanlan	Sunk in 12 ft. of water by Str. H. M. Pellatt as she tried to make her dock	Toronto harbor.
July 2	Schr. John Schuette	The Schuette became unmanageable in a half gale and was sunk by the steamer Alfred Mitchell. Total loss	Lower Detroit river.
July 2	Str Alfred Mitchell	Collided with Schr. Schuette, sinking her; not badly damaged	Lower Detroit river.
July 2	Schr. Melbourne	Pounded against dock in storm and sank; cofferdam built around her; floated July 14	Cleveland outer harbor.
July 4	Str. John Sherwin	Ran aground under breakwater; released after lightering 500 tons of ore; uninjured	Buffalo harbor.
July 9	Str. Thomas F. Cole	Bumped against Str. City of Buffalo; lost anchor	Cleveland harbor.
July 9	Str. D. B. Meacham	Ran aground while trying to make the harbor without a tug; released after lightering 1,000 tons, uninjured	Indiana harbor.
July 12	Str. John B. Cowle	Sunk in collision with Str. Isaac M. Scott in dense fog; fifteen members of her crew lost; the Cowle was struck amidships and sank in three minutes	Off Whitefish Pt., Lake Superior.
July 12	Str. Isaac M. Scott	Collided with Str. John B. Cowle; badly damaged at bow; sent to Superior for repairs; docked July 16 and completed repairs Aug. 2; 30 plates damaged	Off Whitefish Pt., Lake Superior.
July 14	Str. H. G. Dalton	Machinery disabled; towed to Cleveland for repairs to boiler	Welland Canal.
July 16	Str. Linden	Disabled by broken shaft; picked up by Str. Robert Mills and towed to Bar Point	Long Point, near Buffalo.
July 22	Str. Brazil	Ran aground; in trying to release herself broke a crosshead pin; towed to Great Lakes Engineering Co's. yard for repairs	Bar Point, Lake Erie.
July 23	Str. Lycoming	Struck a dock; slightly damaged	Cleveland outer harbor.
July 24	Str. Amazon	Struck; slightly damaged	Point Iroquois.
July 26	Str. Faustin	Damaged by fire of unknown origin; repaired at Detroit	Sandusky.
July 28	Str. Queen City	Bolt gave way and she blew off her high pressure cylinder head.	Point Au Barques.
	Str. P. A. Widener	In collision with Str. E. J. Buffington; repaired at Lorain	Soo.
	Str. E. J. Buffington	In collision with Str. P. A. B. Widener; temporarily repaired at Duluth	Soo.
Aug. 1	Str. Cadillac	Bumped by Str. Mariposa and thrown across bow of Str. Craig, down bound; sank	St. Clair Flats channel.
Aug. 1	Str. Geo. L. Craig	In collision with Str. Cadillac; somewhat damaged above water line; repaired at Cleveland	St. Clair Flats channel.
Aug. 1	Str. O. M. Poe	Steering gear disabled; tug sent to tow her to Sault, where temporary repairs were made	Off Round Island, Lake Superior.
Aug. 1	Str. Glenellah	Struck breakwater after leaving canal, owing to clogged wheel chain; badly damaged forward; temporarily repaired	Port Colborne, Ont.
Aug. 1	Bge. James Nasmyth	Hit under light pier head when being towed out; stern struck carrying away rudder and tearing hole in one side; six plates damaged; repaired at Cleveland; new rudder put on	Ashtabula, O.
Aug. 1	Str. Benton	Burned; total loss	River Rouge, Mich.
Aug. 3	Str. Mapleton	Ran ashore in dense fog; released after lightering 500 tons of pig iron; eight plates damaged forward; forepeak full of water; docked at Ecorse	Near Detour.
Aug. 3	Str. Wm. Rudolph	Broke air pump; towed to Port Huron by Str. Shenandoah	Abreast of Point Au Barques.
Aug. 5	Str. P. J. Ralph	Badly damaged by fire forward	Gargantua, Lake Superior.
Aug. 5	Carferry P. M. No. 20	Struck by lightning; forward spar shattered; all lights put out; captain and mate stunned	Manitowoc harbor.
Aug. 5	Str. John B. Trevor	Arrived at Lorain with broken cylinder head	
Aug. 5	Str. Faustin	Broke down and was towed to Amherstburg by tug	Near Green Island, Lake Erie.
Aug. 6	Str. Louisiana	Wheel chains parted; struck dredge Columbia; stern twisted	Near Bar Point, Detroit river.
Aug. 6	Dredge Columbia	Struck by Str. Louisiana; badly damaged; repaired at Superior; new stem	Near Bar Point, Detroit river.
Aug. 8	Str. Pathfinder	Went on rock bottom in fog; rammed by her consort; 35 plates damaged; new wheel, rudder and quadrant required; docked at Cleveland after being lightered; repairs completed Sept. 2	Off Eagle river, Lake Superior.

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	LOCATION.
Aug. 8	Bge. Sagamore	In tow of Str. Pathfinder ramming her when she went ashore; badly damaged; forepeak full of water; repaired at Toledo; repairs completed Sept. 2	Off Eagle river, Lake Superior.
Aug. 8	Str. D. B. Meacham	Broke steering gear while backing away from dock; repaired at Superior	Two Harbors, Minn.
Aug. 13	Str. Henry Phipps	In collision with Str. Morrell in thick weather; docked at Lorain	Round Island, Lake Superior.
Aug. 13	Str. Daniel J. Morrell	In collision with Str. Henry Phipps; hole torn in her side and number of plates damaged; repaired at Superior	Round Island, Lake Superior.
Aug. 13	Schr. St. Joseph	In collision with Str. Rockefeller; towed near to the American shore, where she filled and sank	Detroit river
Aug. 15	Str. Wm. A. Hawgood	On the bottom; had to lighter to get to her dock	Huron, O.
Aug. 15	Str. Gargantua	Collided with sand sucker McKerchey in fog; docked at Reid's, Port Huron	St. Clair river.
Aug. 15	Sands'r Jno. M. McKerchey	In collision with Str. Gargantua; taken to Ecorse for repairs	St. Clair river.
Aug. 16	Str. Jas. E. Davidson	Flue blew out, badly scalding one of engine-room force	St. Clair river.
Aug. 17	Bge. Athens	Sprang leak after taking on cargo of ore and settled on bottom in shallow water	Escanaba.
Aug. 17	Str. Glengarry	Struck concrete "island" of Atwater bridge, sustaining break in forepeak, through which water rushed so that she settled on the bottom; cargo of wheat damaged; lightered	Lachine Canal, St. Lawrence river.
Aug. 18	Str. Lyman C. Smith	Disabled by breaking low pressure crank pinhead; towed to Duluth	Above Soo.
Aug. 18	Str. America	Grounded coming out; released after lightering 200 tons of coal	Buffalo harbor.
Aug. 19	Str. City of Green Bay	Destroyed by fire; total loss	Saginaw Bay.
Aug. 20	Tug Frank W.	Went ashore while towing Standard Oil Barge, No. 41	Niagara reef.
Aug. 22	Str. Norman B. Ream	Collided with Str. Senator; anchors caried away; stern twisted; repaired at Lorain	Detour.
Aug. 22	Str. Senator	Collided with Str. Norman B. Ream; large hole torn in her side abreast of boiler house, letting in water so that she sank, after part entirely under water and forward on rocks; floated Sept. 9 and towed to Cleveland for repairs; docked Oct. 11; 80 or 90 plates damaged and many frames broken; left dry dock Nov. 11	Detour.
Aug. 22	Bge. Plymouth	Damaged in collision with Str. Taugham; sank near Limekiln crossing while being towed to lower lakes; docked at Detroit	Marine City.
Aug. 22	Str. Brazil	Ashore; bottom damaged; water in engine-room and fire hold; released after lightering part of cargo; docked at Cleveland; badly damaged	Vidal Shoals, above Soo.
Aug. 24	Str. Collingwood	In collision with Str. Geo. L. Craig; 35 ft. hole in starboard side amidships; sank in 35 ft. of water; rivets sprang, frames and tank top broken; raised and pumped out Oct. 3	Off Sandwich Pt., Detroit river.
Aug. 24	Str. Geo. L. Craig	In collision with Str. Collingwood; went to Ecorse; stem twisted; hole in starboard bow; accident caused by clogged wheel chains; repaired at Toledo	Off Sandwich Pt., Detroit river.
Aug. 24	Tug Thos. Wilson	Caught a log in her wheel; disabled; towed to Cleveland for repairs	Ashtabula harbor.
Aug. 25	Schr. Jura	Collided with Str. W. G. Pollock; headgear and part of stem carried away; towed to Mackinaw City in leaking condition by Str. Pollock	Lake Michigan.
Aug. 30	Str. Sierra	In mix-up with Str. Tionesta; lost her anchor	Cleveland outer harbor.
Aug. 31	Schr. E. B. Maxwell	Stranded on extension of east breakwater and became total loss	Cleveland.
Sept. 1	Str. Northern Wave	Fire in after hatch; part of cargo jettisoned; lay at anchor all night fighting flames	Whitefish Point.
Sept. 2	Str. German	Aground; part of ore cargo lightered; released, after which she reloaded lightered ore	Head of Sault Canal.
Sept. 2	Bge. Sagamore	In collision with Bge. George Hartnell; had just left shipyard; five plates damaged; returned to shipyard for repairs; completed Sept. 13	Off Turtle Light, Toledo.
Sept. 3	Bge. Sam Flint	Towed to port by Str. Hall in leaking condition with mainmast gone as result of storm	Manitowoc.
Sept. 5	Str. Arthur H. Hawgood	Released; divers put cement patch on her forward compartment; docked at Lorain Sept. 11	Near upper end Canadian Sault.
Sept. 5	Str. B. F. Berry	Grounded; released after lightering 250 tons of coal	St. Clair Flats canal.
Sept. 6	Str. Northern Queen	Broke down; towed to Duluth by Str. Edwin N. Ohl	Keweenaw Pt., Lake Superior.
Sept. 10	Tug Columbus	Burned	Gargantua, Ont.
Sept. 13	Bge. James Nasmyth	Grounded; released after lightering	Abreast of Amherstburg.
Sept. 13	Tug Home Rule	Got line in her wheel; temporarily disabled	
Sept. 13	Tug Maruba	Struck by Bge. Sagamore; starboard bow stove in; stem twisted; repaired at Cleveland	Above Sault canal.
Sept. 16	Str. W. W. Brown	Arrived with disabled air pump; temporarily repaired	Sault Ste. Marie.
Sept. 16	Str. Choctaw	Steering gear disabled; lay to to make repairs	Near Port Huron.
Sept. 16	Str. P. P. Miller	Grounded at harbor entrance; released after lightering 400 tons	Huron, O.
Sept. 17	Str. Alva C. Dinkey	Steering gear disabled; collision with Str. Eastern States narrowly averted	Detroit river.
Sept. 17	Str. Alexis W. Thompson	Struck obstruction in channel; somewhat damaged	Ashtabula harbor.
Sept. 18	Str. John Pridgeon Jr.	Wrecked in storm; total loss; cargo of lumber may be saved	14 miles from Cleveland.
Sept. 18	Str. Lackawanna	Steering cable parted when she took a sheer between Str. Shenandoah and Bge. Chieftain colliding with latter; many plates smashed on starboard side; towed to Canadian shore where she sank; raised Sept. 22 and repaired at Detroit; hole 50 ft. long in her side; two weeks to make repairs	Abreast of Port Huron.
Sept. 18	Bge. Chieftain	Struck by Str. Lackawanna; stem broken off from tip of rail to below water; many planks broken	Abreast of Port Huron.
Sept. 18	Tug H. B. Abbott	Broke crankshaft and wrecked engine	Cleveland.
Sept. 18	Str. Monteagle	Struck a submerged crib; large hole stove in port bow; sank in 16 ft. of water; grain cargo badly damaged; raised and repaired temporarily but was destroyed by fire just as she was to leave her dry dock; started in coal bunker; total loss	Mud Lake, St. Mary's river.
Sept. 19	Bge. Abyssinia	Ran aground; released after lightering 600 tons of ore; docked at Cleveland for repairs	St. Clair river.
Sept. 20	Str. John Owen	Put back to port to repair broken valve in her steering engine	Port Huron.
Sept. 21	Str. Samoa	Burned to water's edge; cause unknown	Osceola Mills, Torch Lake.
	Sandsucker Muskegon	Picked up by tug Goulder in disabled condition	Lake Erie, near Cleveland.
Sept. 22	Str. H. B. Nye	Struck obstruction thought to be boulder thrown into channel by blasting; No. 1 tank on port side full of water; stopped at Sault for repairs	Near Sailors' Encampment.
Sept. 22	Str. City of Berlin	Collided with Schr. S. D. Warriner in tow of tugs Frank W. and Kennedy; stem smashed; caught fire while in dry dock; damage, $500	Cuyahoga river.
Sept. 22	Str. Maruba	Collided with Bge. Sagamore; repaired at Cleveland	
Sept. 23	Str. R. L. Ireland	Collided with Str. Mary Elphicke; stern badly damaged; stopped at Great Lakes Engineering Works for repairs	Bar Point, Detroit river.
Sept. 23	Str. Mary Elphicke	Collided with Str. R. L. Ireland; was able to proceed on trip after slight delay; repaired at Erie when she unloaded	Bar Point, Detroit river.
Sept. 23	Str. Adiramled	Grounded on a reef; released after lightering; slightly damaged	Near M. Bass Island, Lake Erie.
Sept. 25	Str. George H. Russel	Struck Muskegon av. bridge while being towed through; $5,000 damage to bridge; steamer not injured	Milwaukee.
Sept. 25	Str. D. R. Hanna	Stranded; hole in No. 1 tank which filled with water; temporarily repaired at the Sault; docked at Cleveland	Round Island, Lake Superior.
Sept. 26	Str. Pontiac	Struck obstruction; two buckets broken off wheel	Off Sable Pt., Lake Superior.
Sept. 27	Str. James Laughlin	Totally disabled by breaking of both her steering gears	Mud Lake.
Sept. 27	Schr. T. Van Straubenzie	Collided with Str. City of Erie; sank	Off Dunkirk, Lake Erie.
Sept. 28	Str. Pontiac	Collided with Str. Uranus in heavy fog; plates on starboard side broken; steamer was beached; patch put over hole in No. 7 hatch	St. Clair river.

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	LOCATION.
Sept. 28	Str. Uranus	Collided with Str. Pontiac in heavy fog; lost an anchor; slightly damaged	St. Clair river.
Sept. 28	Str. E. H. Gary	Broke down and had to be towed to Duluth by Str. H. C. Frick	Lake Superior.
Sept. 29	Bge M. B. Grover	Struck a leak; 5 ft. of water in hold; badly damaged	Off Harbor Beach, Lake Huron.
Sept. 30	Str. D. R. Vanalen	Picked up in disabled condition by Str. W. D. Rees and towed to Port Huron	Off Port Sanilac, Lake Huron.
Oct. 3	Str. Socapa	Ran aground; released Oct. 5 after lightering 700 or 800 tons of coal.	Detroit river.
Oct. 4	Str. J. G. Munro	Collided with Str. Lyman C. Smith; four plates damaged on starboard side; heavy fog	Sault river.
Oct. 4	Str. Lyman C. Smith	Collided with Str. Munro; stem twisted to starboard; slight damage done to plates on port bow; heavy fog	Sault river.
Oct. 4	Str. Mars	Lost her shoe; towed to Lorain by tugs for repairs	
Oct. 6	Str. Cherokee	Lost her stern bearings; towed to Toledo for repairs	Saginaw Bay.
Oct. 6	Str. Yosemite	Hit overhead feed wires at Newburg & South Shore R. R. bridge and broke her topmast	Cleveland.
Oct. 6	Str. Ball Bros.	Ran aground; released Oct. 8 after considerable pulling and lightering	Bois Blanc Island, Detroit river.
Oct. 6	Str. Frank C. Ball	Became disabled; stopped at Port Huron for repairs to her wheel.	Detroit river.
Oct. 8	Str. Douglass Houghton	Hit the bank while swinging around to anchor in fog and damaged her rudder; towed to the Sault for repairs	Mud Lake.
Oct. 10	Str. City of Traverse	Hit Wells st. bridge; part of cabin carried away as well as railing and upper works; upper deck damaged also	Chicago river.
Oct. 10	Str. Sinaloa	Struck a rock; puncturing No. 4 tank on port side; stopped at Duluth for repairs	St. Mary's river.
Oct. 11	Str. J. H. Sheadle	Grounded at south entrance; floated Oct. 19	Buffalo harbor.
Oct. 12	Str. Wyoming	Ran ashore in storm; released Oct. 19; most of her cargo lightered; reached Chicago on 27th	Near Manitowoc.
Oct. 13	Str. Douglass Houghton	Collided with her barge in heavy weather; went to Ecorse for repairs	Lake St. Clair.
Oct. 13	Str. George Stone	Struck hard on sand bar and was badly pounded by storm; hull sank; five of crew drowned; also caught fire; total loss; engine and boiler recovered	Off Pt. Pelee, Lake Erie.
Oct. 13	Str. John B. Trevor	Ran ashore in storm; full of water and in bad shape; engine forced up 6 in. and air pipes driven through main deck 15 in.; bottom very badly damaged full length of vessel; stripped about Nov. 15 and abandoned for the season	Isle Royal, Lake Superior.
Oct. 13	Bge. Chieftain	Picked up by Str. Shenandoah in storm; leaked badly	Off Fairport, Lake Erie.
Oct. 14	Str. John Stanton	Struck while entering in storm; leaked	Lorain harbor.
Oct. 14	Str. Athabasca	Stranded on rocks in storm; released Oct. 17; forward part of hull damaged; to be repaired at Collingwood; damage $40,000	Flower Pot Island, Georgian Bay.
Oct. 14	Str. Shenandoah	Came to Cleveland for repairs after being out in storm; leaked; ..stern pipe broken; repaired Oct. 15	Lake Erie.
Oct. 14	Str. A. C. Dinkey	Slightly damaged by striking anchor lost by Str. City of Cleveland.	Bar Point, Detroit river.
Oct. 14	Str. J. J. Hill	Slightly damaged by striking anchor lost by Str. City of Cleveland.	Bar Point, Detroit river.
Oct. 14	Bge. Tyrone	Broke away from Str. Maytham and crashed against piling in storm	Buffalo.
Oct. 15	Str. S. M. Clement	Ran aground, practically blockading up and down-bound boats; released on 16th; two compartments full of water	Lake St. Clair.
.....	Str. Western Star	Grounded at entrance; floated Oct. 19	Buffalo harbor.
Oct. 18	Str. Turret Chief	Struck while entering port; rudder damaged	Ashtabula.
Oct. 19	Str. Geo. C. Markham	Ran into a closed bridge; pilot-house badly wrecked and spars broken	Chicago river.
Oct. 21	Str. Pentland	Ran on rocks; released herself and went to Milwaukee for repairs.	Plum Island, Lake Michigan.
Oct. 21	Str. Stadacona	Ran aground; out 22 in. forward and 16 in. aft; released on 23rd after lightering 30,0000 bu. of wheat	Near Bar Point lightship.
Oct. 22	Str. Polynesia	Collided with Str. H. C. Frick; three damaged plates; repaired at Superior	Sault.
Oct. 22	Str. H. C. Frick	Collided with Str. Polynesia; one plate cracked above water line.	Sault.
Oct. 22	Str. D. O. Mills	Ran aground; released on 23rd after lightering	Mackinac Island.
.....	Bge. Alex. Holley	Collided with Str. Superior City; docked at Superior for slight repairs to her bow	Whitefish Point.
Oct. 23	Bge. Chattanooga	Steering gear became disabled; crashed into Str. Hamonic tied up at Point Edward freight sheds; leaked	St. Clair river.
Oct. 23	Str. Hamonic	Hit by Bge. Chattanooga; several plates and frames broken and paneling in barber shop cracked	Port Huron.
Oct. 23	Tug William D.	Turned turtle and sank in 21 ft. of water; raised; machinery saved but hull totally wrecked	Ashtabula.
Oct. 23	Str. Shenango	Went onto riprap on the west breakwater; steering gear damaged; repaired at Ecorse	Ashtabula.
Oct. 23	Str. J. J. H. Brown	Arrived at Sault with broken steering gear	
Oct. 24	Str. E. W. Oglebay	Broke air and feed pumps and returned to Port Huron for repairs.	
Oct. 25	Tug Marion	Turned turtle; crew rescued; raised Oct. 26	Old riverbed, Cleveland.
.....	Str. E. C. Pope	Struck an anchor in the channel; repaired at Superior; 26 damaged plates	Bar Point.
.....	Str. Saronic	Threw one of her buckets off wheel; opposite bucket taken off when she reached the Sault	Lake Huron.
Oct. ..	Str. John A. Donaldson	In distributing her grain cargo to several elevators she broke her shoe and bent her rudder; docked at Cleveland; repairs completed in eight days	Buffalo.
Oct. 26	Str. Myron	Stopped at Sault for repairs to her boilers, which leaked badly	Lake Superior.
Oct. 27	Str. Wm. A. Rogers	Became disabled; Str. James Corrigan went to her assistance	Above Fort Gratiot St.
.....	Str. Luzon	Hit a dock; damaged a few plates; repaired at Buffalo	Superior.
Oct. 28	Str. City of St. Ignace	Crosshead cracked; repaired at Cleveland	
Oct. 28	Str. Saturn	Broke her intermediate cylinder and was picked up by Str. Northern Queen and towed to Marquette	Lake Superior.
Oct. 29	Str. M. J. Greene	Ran ashore; tug sent to her from the Sault; released and docked at Port Huron; new shoe and some new planking required	Wallace Island, St. Mary's river.
.....	Str. Saturn	Picked up in disabled condition after drifting about helpless for twenty-four hours, and towed to Marquette for repairs	
Nov. 1	Str. Amazon	Lost an anchor	Cleveland.
Nov. 1	Bge. Shawmut	Rammed and sunk by steamer America	Buffalo harbor.
Nov. 3	Drill boat Destroyer	Badly damaged by explosion of dynamite; some of crew injured	Livingstone channel.
Nov. 5	Str. Choctaw	Two hatch covers broke in heavy sea; brave work of crew prevented vessel from going down in deep water; repaired at Marquette	Lake Superior, off Grand Marais.
Nov. 8	Str. Falcon	Stranded; abandoned by owners to underwriters on Nov. 12 and later by underwriters as total loss	S. Fox Island, Lake Michigan.
.....	Str. Centurion	Lost an anchor off Presque Isle ore dock	Marquette.
Nov. 10	Str. I. L. Ellwood	Rammed upper gate and demolished south half of it; steamer's stem twisted and she will be docked for repairs; only slightly damaged	Poe lock, Sault canal.
Nov. 12	Str. Philip D. Armour	Ran ashore at harbor entrance on rocky bottom; released Nov. 15 after lightering	Buffalo.
Nov. 12	Str. Sahara	Went into dry dock this date; 15 damaged plates 9 of which must be replaced; 20 floor frames damaged	
Nov. 13	Str. Ward Ames	Collided with steamer Charles Weston; proceeded on up trip; repaired in five days at Superior	Sault.
Nov. 13	Str. Chas. Weston	Collided with Str. Ward Ames; beached by her captain; hole on port side amidships 2 ft. wide from spar deck to 11-ft. mark, a distance of 19 ft.; No. 2 tank full of water; lightered 2,000 tons of ore; temporary repairs completed Nov. 22; docked at Lorain	Sault.
Nov. 13	Str. Wm. Edwards	Ran on rock in fog; out 18 in.	Colchester Reef, Lake Erie.